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Predator and Rodent Control in Eastern Montana



by Brian Hanson

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PREDATOR AND RODENT CONTROL

IN EASTERN MONTANA

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THE ECONOMIC DEVELOPMENT ASSOCIATION OF EASTERN MONTANA

and

WESTERN INTERSTATE COMMISSION FOR HIGHER EDUCATION

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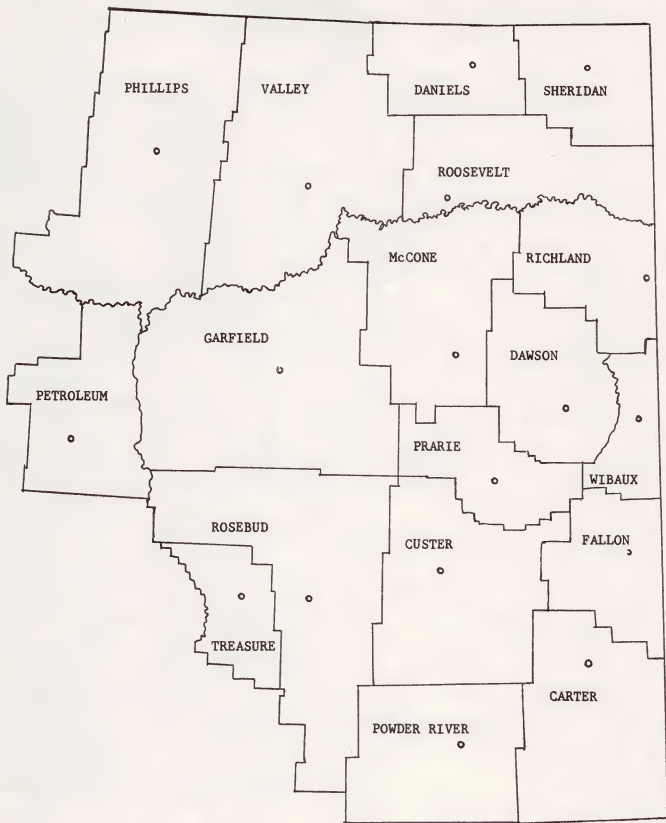
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ECONOMIC DEVELOPMENT ASSOCIATION
OF EASTERN MONTANA



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ABSTRACT

This report presents an analysis of predator and rodent damage, control techniques and predator control programs in the 18 counties which are encompassed by the Economic Development Association of Eastern Montana.

EDAEM conducted a predator and rodent survey in July and August 1974, covering losses incurred from January 1 to July 1, 1974. Six hundred and twelve surveys were distributed to wool growers in the 18 counties with 108 returned surveys used for analysis. The coyote and red fox accounted for 99.8 percent of the predation on livestock in eastern Montana. The percent loss caused by predators was 6.69 percent on lambs, .84 percent on sheep and .37 percent on calves. The total dollar loss caused by predators in the 18 counties was \$83,378. Forty-two percent of the returned surveys indicated sheepmen were either quitting or decreasing their sheep operation.

Any coyote control method must take account of the coyote's adaptability. Sodium monofluoroacetate, 1080, was probably the most effective control technique for reducing coyote populations. The M-44 is the most humane chemical toxicant. Preventing predator depredations by the use of chemical repellents, sounds and lights is the most desirable form of predator control if these methods become effective. By proper management, predator losses can be stopped or at least reduced. The bounty system is not a recommended tool for reducing predation on livestock. The executive order on February 8, 1972 banning the use of poisons on federal lands, and the March 9, 1972 suspension

of the use of 1080 and sodium cyanide by the Environmental Protection Agency stopped the use of chemical controls that ranchers had been depending upon.

The Montana predator animal control program is jointly carried out by the Department of Livestock and the U.S. Fish and Wildlife Service. The Fish and Wildlife Service conducts most of the control operations. The control programs in North Dakota, Wyoming, Idaho and Colorado are administered by the State Department of Agriculture. South Dakota operates it's program under the Department of Game Fish and Parks.

There are eleven possible predator animal control programs. A control program should serve the specific needs of each individual county. Predator control programs should elicit the cooperation and participation of federal and state agencies, livestock associations and organizations, environmental groups, and county government. Of the eleven control programs covered, the U.S. Fish and Wildlife Service, or the Department of Livestock, or a county program or a combination approach might work in eastern Montana.

Eighty-eight percent of the returned questionnaires (EDAEM survey, only sent to wool growers) showed some rodent damage. Sixty-four percent of the ranchers who indicated rodent damage had no control program. The 18 county area reported rodent damage was \$55,205. Rated by dollar damage, the prairie dog was the most important followed by the Richardson ground squirrel and the pocket gopher. Strychnine oats is effective for rodent control. The proper strength rodenticide can be obtained from your county poison distributor.

ACKNOWLEDGEMENTS

There are two key persons who deserve special thanks for the information presented in this report. Kenneth Seyler, Environmental Coordinator, Brands Enforcement Division, Montana Department of Livestock, Helena; and Paul Bunke, District Supervisor, Division of Control, U.S. Fish and Wildlife Service, Miles City.

In addition, other state organizations provided valuable input into my report. Ralph Dreyer, President, Montana Wool Growers Association; Kenneth Quickenden, Vector Control Specialist, Montana Department of Health and Environmental Sciences. The Montana Department of Fish and Game provided assistance from several employees: Keith Seaburg, Regional Coordinator; Fletcher Newby, Deputy Director; and Bill Schneider, Editor, Montana Outdoors magazine. Montana Representative, John Melcher, provided several books for reference.

Interviews with the Cooperative Extension Agents in the 18 counties supplied a wealth of knowledge on the rodent and predator situation in each county.

Other states supplied helpful information on their control programs and research. Appreciation is expressed to the Departments of Agriculture in North Dakota, Wyoming, Idaho, and Colorado. The South Dakota Department of Game Fish and Parks provided data on their predator control program. In addition, information came from other Colorado sources; Dale Wade, Extension Wildlife Specialist, Colorado State University, and Donald Balser, Chief Predator Damage Research, U.S. Fish and Wildlife Service, Denver.

Without the cooperation of the county assessors and wool pools, the

Economic Development Association of Eastern Montana's predator and rodent survey would not have been possible. Thanks is warranted to the individuals who took the time to fill out survey forms.

I want to thank EDAEM's staff for their helpful comments during the summer of my study. The secretarial staff deserves special thanks for their patience in typing my project report as well as numerous letters.

I am indebted to EDAEM and its range committee, headed by Dennis Nathe, and to WICHE for sponsoring this project.

Most of all I thank Don Anderson, Resource Conservationist, Soil Conservation Service assigned to EDAEM, for his suggestions on information sources and his review and comments on my report.

INTRODUCTION

The 18 eastern counties comprise over one third of Montana's area. Eastern Montana can be described as rolling plains, rugged breaks, and badlands. Rolling terrace-like plains are the dominant feature. The northern third of the area is rolling hills modified by glaciation. The Missouri and Yellowstone Rivers have an effect on the climate in this region. Long hours of sunlight in the summer, the low degree of cloudiness and the intensity of the sunlight permit growth of a wide range of crops. Many people are looking to eastern Montana for the vast coal resources and plentiful water for development of the energy needs of the nation.

Sixty-three percent of the 94,000 people are settled in rural areas. Of the 31,700,000 acres of land, 79 percent is range and pasture and 18 percent is cropland. Land ownership is 68 percent private, 25 percent federal and 7 percent state.

The 123 million dollar livestock industry is the primary source of income in the 18 counties. Sheep numbers have been declining in the 18 counties as well as in the state (Appendix 1,2). A recent survey has shown that the primary condition affecting the Montana wool grower is predators (Seyler 1973). The current predator control program in eastern Montana does not seem to be significantly reducing damage caused by predators. Many sheepmen have quit and turned to cattle as shown by the decreasing number of sheep and the increasing number of cattle in the 18 counties (Appendix 3). Sheep losses to predators is not the only livestock loss as illustrated by the increase in calf losses.

Rodents also constitute a loss to ranchers. Rodents eliminate

grazing land and destroy crops. Many ranchers have rodent damage but have no rodent control program.

As a result of these significant problems in eastern Montana the Economic Development Association of Eastern Montana decided to initiate a study into the predator and rodent situation. The findings of a three month study during the summer of 1974 is contained in this report.

The purpose of this report is to determine predator and rodent damage in the 18 counties of eastern Montana and present different solutions to the damage caused by these animals. This is achieved by presenting: 1) data on the predator and rodent damage within the 18 county area of eastern Montana, 2) information on predators and rodents and the control techniques used for each, 3) information on the present program of animal control, 4) the history of predator control policies and regulations, 5) various alternative predatory animal control programs, 6) recommendations for improvements to be implemented by federal, state, private organizations and/or EDAEM, and 7) the attitudes, opinions, and facts expressed by ranchers and the urban public.

The information in this report was gathered from the Montana Department of Livestock, the U.S. Fish and Wildlife Service, the Montana Wool Growers Association, the Cooperative Extension Service, various other agencies in Montana and other states and the literature that was available on predators, rodents and control measures.

PREDATORS

A predator is an animal that depends upon other animals as a source of food. Predators that cause damage in eastern Montana include the coyote, domestic dog, red fox, bobcat, eagle, skunk and raccoon.

RANCHER'S VIEW

The most limiting factor in livestock production (especially sheep) today is predation. Unless we (ranchers) can stop or decrease losses from the coyote and red fox we will be forced out of business.

"If members of the U.S. Senate knew that they would be assaulted and held up by robbers just about every other night on their way to their homes from the Capitol, that over the next 12 months they would be forced to hand over to the robbers a total of 15 percent of their Senate salaries, they would be demanding action to control an unacceptable situation."
(Haskell 1973:244).

There is no reason why we should have to sacrifice animals to predators. A businessman is able to do most anything he wants to protect his business. Likewise businessmen would not go into a business with a built in loss.

Ecologists do not have their life and savings tied up in livestock and should take an objective look at the economic losses caused by predators.

What right do ecologists have to tell us how to run our business? We don't dictate procedures of management to them.

The consumers are screaming about the high cost of meat, but they (so called ecologist) will not let us use the only effective tool we have to decrease predation on livestock, thus decreasing the cost of meat.

Before the executive ban on poisoning on federal lands, the Department of the Interior removed 80 percent of their predators by the use of chemical toxicants. We need predicides (1080 & sodium cyanide) to reduce coyote populations. There never was substantial evidence to prove that under controlled use 1080 and sodium cyanide caused damage to the environment or endangered animal species.

"There is not a single species that is declining or has become rare and/or endangered as a result of the Bureau's control program." Statement of Jack Berryman, Chief of the Division of Wildlife Services, Bureau of Sport Fisheries and Wildlife (Dingell 1973:390).

1080 is used in the cities, yet we can't use it in rural areas.

Strychnine eggs seems to be the only effective control measure to prevent livestock and human exposure to rabies in areas where skunks have been diagnosed as rabid.

We would be willing to use other predator control methods if they were also economical and effective. When poisons were removed there was no other method available to take their place. Losses have increase since that time. We support research for "better" techniques.

Everybody talks about a humane control method. Is it humane to have a sheep torn apart by a coyote? Is the sheep's lingering death to be forgotten?

Man has bred sheep and cattle for hundreds of years and as a consequence, they have no predator escape mechanisms. It is man's obligation to protect the helpless animals that he has created.

Ecologists talk about the ecosystem and how the coyote is an integral part of it's complex workings. Well, man and his domestic animals are part of the ecosystem also and must be maintained. "Man cannot use land and

expect to also preserve all of the original vegetation and it's associated fauna." Statement of Walter E. Howard, professor of Wildlife Biology and Vertebrate Ecologist (Dingell 1970:288).

ECOLOGIST VIEW

We "ecologists" admit that predators can become a serious source of livestock losses. We would like to know the significance of predator losses as compared to other losses and the total predator loss in the entire industry.

The rancher must accept some losses due to the fact that they are in an environment where predation is a way of life for many species of wildlife in the vicinity. Predator loss is inherent in the livestock business just as insect damage is to croplands. There is no economically feasible method to stop all losses caused by either organism.

Control methods should be economical, selective for the problem animal, humane for all animals taken, effective for target species, safe for humans and livestock, not result in environmental degradation and acceptable to the majority of the public. It seems that some ranchers will use any method as long as it decreases their losses. A control method should not be used if it is not selective, even if it is economical and decreases losses.

Is population reduction of a species really necessary to decrease losses? Control should be aimed at the problem animal, not species. It is estimated that 75 percent of the coyote population must be reduced each year to maintain the population at a low level (Haskell 1973:172). Can any control method achieve this?

Predators are opportunistic feeders. They often take the sick and

we can thus culling herds of the unfit individuals. Some sheep and cattle might have died anyway.

Livestock used to be raised without poison controls. Maybe the rancher has changed his management operation to become more vulnerable to predation. Perhaps management (prevention) is the solution to predator losses, not coyote reduction campaigns.

The wide spread use of 1080 placed in carcasses for coyote control might have altered the behavioral structure of the coyote. Those that ate the dead baits died, those that preyed on live animals lived, thus producing a more predatory strain of coyotes (Haskell 1973:298, Dingell 1973:212, Cain 1972:45).

Are poisons really that effective? Data from four western states showed no significant difference in total losses before and after the introduction of 1080 (Cain 1972:111).

Is predator control economically feasible? Is it worth it to spend 100 dollars on predator control to save 100 dollars worth of sheep? If the control program is more costly than the value of the animals saved the program should be discontinued.

Some predator control methods are very unselective. If there are endangered species in the area, there is a chance of removing them from the face of the earth forever.

We should support an all out effort of discovering new ways of alleviating damage.

Predators serve an important function scavenging dead animals. Not only is this more efficient use of energy, but it can also stop the spread of disease.

There is abundant evidence to show that predators are beneficial in regulating some big game populations and sometimes preventing rodent explosions (Yellowstone Park, Toponas Grassland Protective Association, Evanson 1967:237-242).

The ecosystem is a very complex mixture of living and nonliving substances. Each individual unit is tied to every other unit in the system. When one unit is removed (e.g. coyote) the effects are felt by all other units. A spider web is like an ecosystem in that when one strand is touched, the vibration is sent throughout the entire web. The ecosystem's stability is directly dependent upon the number and various kinds of units (number of strands and the different lengths of strands in a web). When the diversity and the numbers of wildlife decrease, the ecosystem is more likely to collapse since it has less "strands" on which to absorb shock to the system. Man has entered the scene and disturbed this delicate balance without knowing the consequences. Nature has been molding and shaping the living ecosystem for over 400 million years. Can man create a more stable ecosystem or should we try to exist in nature's ecosystem?

Why is predator control so controversial?

1. Every point presented in both views are valid under some circumstance.
2. There is very little good data to support the viewpoints. Some viewpoints are valid but cannot be supported by data.
3. Each side will not take the time to listen to the opposing viewpoint.
4. There is emotion involved which disrupts rational thinking.

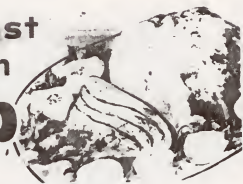
There are three points on which both sides agree. 1) In some cases predation does constitute a serious loss; 2) control measures should be initiated if there is substantial loss; 3) research for better control methods is needed.

Both sides have one basic disagreement. The "ecologist" criticizes the rancher for depending on chemical toxicants for control and not looking for other solutions. On the other hand, the rancher looks at the methods available and says this one works best, why not use it? There is no control technique at the present time to meet the ecologists' criteria and still remain effective.

If every point is valid, as stated in the opposing viewpoints, what then is the solution? Each side must make concessions.

PREDATORS

Enjoy Finest
American
Lamb



Can Coyotes Read? (Photo Brian Hanson)



Most surveys which measure the economic effects of predation on livestock only take into account the value of the animal lost. In addition, the rancher loses income from other sources directly relating to predation. Some of these factors include:

1. Weight loss from animals being chased.
2. Poor health of an animal that doesn't eat because of nervousness.
3. Injuries to an animal restricting his growth or fertility.
4. Miscarriages of lambs because of predator harassment.
5. Losing an animal also loses the investment of time and money it took to feed the animal.
6. Additional labor requirements needed for the care and protection of the animals.
7. Money expended for predator control.
8. Death or injury of an ewe which has not been milked by lamb.

Unfortunately most of these factors are intangible and can not be measured.

The following surveys show numbers and dollar values for predator losses on livestock. Before control programs can be justified, the loss must be measured.

Economic Development Association of Eastern Montana

The Economic Development Association of Eastern Montana conducted a predator/rodent survey in the 18 county area during July and August 1974 (Appendix 4,5). Six hundred and twelve survey forms were distributed. Wool growers were selected for the survey with the names being obtained from various sources; (wool pools, assessor lists, Department of Livestock, Extension Service). In addition, surveys were distributed at three range tours held in the area. Because of the large numbers, only half of the

ranchers were surveyed in Garfield, Powder River and Carter Counties. The predator damage assessment covered the period from January 1 to July 1, 1974. Of the 612 surveys, 128 were returned with 108 providing information for predator damage. This was a return of 17.6 percent.

The predators responsible for livestock damage as listed in the surveys include the coyote, red fox, dog, bobcat, golden eagle and raccoon. The skunk was listed causing duckling losses but no livestock losses. Livestock killed include sheep, lambs, cattle, calves, swine, turkeys and chickens. The coyote and red fox accounted for 99.8 percent of the total sheep and calf losses (coyote - 70.7%, red fox - 29.1%). The red fox took 1 ewe, no calves and 737 lambs or 33 percent of the total predator lamb loss in the 18 county area.

Sixty-five percent of the 108 usable surveys indicated some predation on livestock. The 18 county percent loss on all livestock reported was 6.89 percent on lambs, .84 percent on sheep and .37 percent on calves (Table 1). Lambs accounted for 88 percent of the total sheep taken by predators. The percent loss of combined lambs and sheep is shown in Figure 1. Five of the counties had over a six percent loss of the total number of sheep and lambs reported.



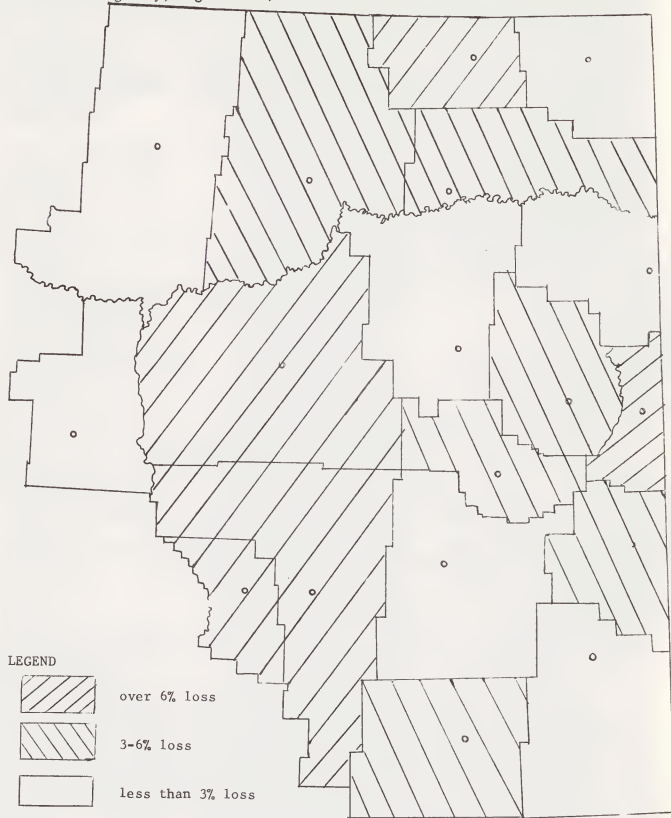
There has been an increase of predation on calves in eastern Montana (Photo Brian Hanson)

Table 1 Percent Loss of Total Sheep, Lambs and Calves in Eastern Montana as reported by EDAEM Survey.*

County	% Loss of Total Sheep Surveyed	% Loss of Total Lambs Surveyed	% Loss of Total Calves Surveyed
Phillips	2.60	.70	.50
Valley	3.07	2.89	4.44
Daniels	0.00	12.80	.70
Sheridan	1.50	2.38	1.09
Roosevelt	1.25	5.63	0.00
District 1	1.68	4.88	1.24
Petroleum	1.60	3.56	.50
Garfield	1.38	12.05	.26
McCone	0.00	12.88	0.00
Richland	3.86	1.69	0.00
Dawson	.15	7.54	.36
Prairie	2.55	8.53	0.00
Wibaux	2.72	10.88	0.00
District 2	1.75	8.16	.16
Treasure	12.50	0.00	1.64
Rosebud	0.00	4.00	8.57
Custer	.13	5.80	0.00
Powder River	1.24	12.38	.13
Fallon	0.00	10.65	0.00
Carter	.04	5.55	0.00
District 3	2.31	6.39	1.72
18 County Total	.84	6.39	.37

* Total animal numbers include all the reported animals on the completed surveys whether or not predation occurred.
 Total Sheep Surveyed 35,745 Total Lambs Surveyed 33,491
 Total Calves Surveyed 11,580

Figure 1. Combined Sheep and Lamb Loss From Predation (EDAEM survey covering July, August 1974).



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The total minimum dollar loss caused by predation as shown by the survey in the 18 counties of eastern Montana is \$83,378 (Table 2, Figure 2).

The EDAEM survey shows livestock losses of:

Sheep	299 (\$ 30) - \$ 8,970	Chickens	169 (\$ 2.00) - \$ 338
Lambs	2,139 (\$ 30) - \$64,170	Turkeys	50 (\$ 7.00) - \$ 350
Calves	43 (\$150) - \$ 6,450	Swine	28 (\$100.00) - \$2,800
Cow	1 (\$300) - \$ 300		

Garfield County had the largest dollar loss with Treasure County having the least. Both District 2 and 3 had five to six times the dollar loss as District 1. It must be realized that the EDAEM survey only covered livestock losses from January 1 to July 1, 1974. Undoubtedly the economic loss will be higher for the total 1974 year loss.

One question on the survey dealt with predator control services each rancher had received in addition to his own efforts.

	Fish & Wildlife Service	Department Of Livestock	County Trapper	Private Trapper	Sportsman	Total
District 1	8	4	2	2	1	17
District 2	15	3	8	7	0	33
District 3	6	4	11	9	4	34
18 Counties	29	11	21	18	5	84

Of the 70 ranchers who reported predation, 71 percent had received some service.

One of the more significant questions included in the survey was:

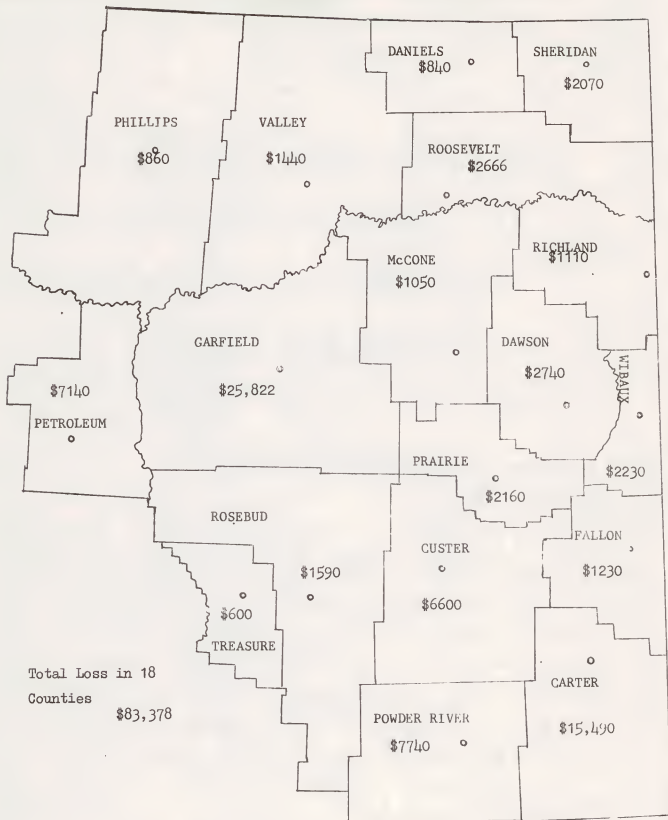
"What are your plans for sheep production in the future?" Increase ____
About the same ____ Decrease ____ Quitting ____.

Twenty-six percent of the ranchers answering the livestock loss section indicated they had already quit or were planning to quit raising sheep. 16.7 percent mentioned a probable decrease in sheep operations. So out of 108 surveys, 46 (42.6%) ranchers were either quitting or decreasing their sheep business.

Table 2. Total Reported Dollar Value of Livestock Losses due to Predation in Eastern Montana.
(EDAEM survey covering January 1 to July 1, 1974)

County	Sheep	Lambs	Calves	Other	Total
Phillips	60	150	600	50	860
Valley	540	300	600	--	1440
Daniels	--	690	150	--	840
Sheridan	270	600	1200	--	2070
Roosevelt	570	2070	--	26	2666
District 1	\$1440	\$3810	\$2550	\$76	\$7876
Petroleum	1530	4710	900	--	7140
Garfield	3120	21690	900	112	25822
McCone	--	1050	--	--	1050
Richland	660	450	--	--	1110
Dawson	30	1620	750	340	2740
Prairie	450	1710	--	--	2160
Wibaux	330	1890	--	10	2230
District 2	\$6120	\$33120	\$2550	\$462	\$42252
Treasure	300	--	300	--	600
Rosebud	--	240	900	450	1590
Custer	150	6450	--	--	6600
Powder River	840	5250	150	1500	7740
Fallon	--	1230	--	--	1230
Carter	120	14070	--	1300	15490
District 3	\$1410	\$27240	\$1350	\$3250	\$33250
18 county total	\$8970	\$64170	\$6450	\$3788	\$83378

Figure 2. Total Value of Livestock Losses Due to Predators (EDAEM survey)



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OF EASTERN MONTANA

Some of the representative statements that were made in the comments section at the end of the survey form follow.

"Quit the sheep entirely. Would like to run them, but coyotes make it impossible."

"I will be forced to quit the sheep business if 1080 bait is not returned and I appreciate all the Bureau of Sport Fisheries and Wildlife has done, they are very cooperative and conscientious."

"We primarily do our own control by airplane, but don't have a permit now so that it is unlawful to kill predators by airplane when they are killing sheep."

"The coyote situation is critical. We do all our calving at sheds and watch calves till a month or so of age to keep coyotes out. The lamb kill goes on continually."

"I do my own aerial hunting and try to take care of predators myself. In 1972 I lost 40 lambs in May and June to coyotes. I started an intensive hunting program and killed every coyote I could find within 20 or 30 miles. I killed about 250 coyotes in a year and a half and consequently lost only 1 lamb to coyotes in 73 and none so far this year."

"The coyote is not a matter of hysteria with me. I have fought him for 20 years, a worthy adversary and well known."

Request for Services

The Department of Livestock compiled request for service forms from the Fish and Wildlife Service in Montana from 1969 to 1973 (Table 3,4). These tables show the number of requests and the amount of livestock damage (sheep and cattle). In the 18 eastern counties the economic loss for sheep predation increased from \$1,377 in 1969 to \$54,530 in 1973. The state figure increased from \$49,277 to \$108,365. Cattle predation loss increased from \$180 to \$7,990 in the 18 counties with the state figures raising from \$5,090 to \$17,950. Request for services have also increased but especially show a dramatic increase since 1972 (Figure 3,4).

Table 3. Requests for Service and Dollar Damage for Sheep Losses (Fish and Wildlife Service data compiled by the Montana Department of Livestock) Treasure and Carter counties have own control program.

County	1969		1970		1971		1972		1973	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Phillips	7	135	37	975	53	1295	128	3045	82	2345
Valley	77	1710	16	470	33	780	111	2015	57	1660
Daniels	--	--	13	230	3	65	11	230	23	655
Sheridan	--	--	2	40	--	--	50	770	14	355
Roosevelt†	3	30	--	--	110	1900	114	2850	23	365
District 1	87	\$1675	68	\$1715	199	\$4040	414	\$8910	199	\$5380
Petroleum	46	745	57	1235	10	155	34	950	71	1855
Garfield	233	3810	96	2115	101	2180	267	5835	581	14797
McCone	9	175	5	115	69	1465	14	400	225	4545
Richland	21	300	48	805	40	835	64	1285	54	1313
Dawson	36	695	24	465	24	465	121	2075	97	2350
Prairie	38	550	30	570	--	--	29	740	72	2015
Wibaux	5	105	2	40	26	590	12	315	26	660
District 2	388	\$6380	262	\$5345	270	\$5690	541	\$11600	1126	\$27535
Treasure	--	--	26	205	--	--	--	--	--	--
Rosebud	109	1980	31	900	116	2715	93	2225	236	6695
Custer	124	2565	156	3525	24	2355	132	2470	161	4300
Powder River	32	515	79	1290	68	1055	279	4995	336	8070
Fallon	43	640	--	--	9	580	54	1240	71	1580
Carter	1	15	--	--	21	300	--	--	50	970
District 3	309	\$5715	292	\$5920	338	\$7005	558	\$10930	854	\$21615
18 County Total	784	\$13770	622	\$12980	807	\$16735	1513	\$31440	2179	\$54530
State Total	2514	\$49277	1931	\$48575	2061	\$45591	3218	\$73761	4276	\$108356

Table 4 Requests for Service and Dollar Damage for Cattle Losses (Fish and Wildlife Service data compiled by the Montana Department of Livestock) Treasure and Carter counties have own control program.

County	1969		1970		1971		1972		1973	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Phillips	--	--	--	--	2	180	6	660	17	1790
Valley	1	90	1	115	2	130	--	--	1	175
Daniels	--	--	--	--	--	--	--	--	--	--
Sheridan	--	--	1	140	--	--	--	--	4	140
Roosevelt	--	--	--	--	5	550	3	300	3	365
District 1	1	\$90	2	\$255	9	\$860	9	\$960	25	\$2770
Petroleum	--	--	--	--	--	--	--	--	2	300
Garfield	--	--	--	--	--	--	--	--	6	1945
McCone	--	--	--	--	2	500	--	--	--	--
Richland	--	--	--	--	4	550	--	--	--	--
Dawson	--	--	--	--	4	1000	--	--	--	--
Prairie	--	--	--	--	--	--	--	--	--	--
Wibaux	--	--	--	--	2	140	--	--	--	--
District 2	--	--	--	--	12	\$2190	--	--	8	\$2245
Treasure	--	--	--	--	--	--	--	--	--	--
Rosebud	--	--	31	1390	--	--	4	380	14	1850
Custer	1	90	--	--	--	--	1	250	--	--
Powder River	--	--	--	--	--	--	2	250	9	1125
Fallon	--	--	--	--	--	--	3	265	--	--
Carter	--	--	--	--	--	--	--	--	--	--
District 3	1	\$90	31	\$1390	--	--	10	\$1145	23	\$2975
18 County Total	2	\$180	33	\$1645	21	\$3035	19	\$2105	56	\$7990
State Total	61	\$5090	87	\$8375	62	\$6705	87	\$10985	133	\$17950

Figure 3 Number of Requests for Service for Predator Control, Fish and Wildlife Service for Sheep Losses 1969-1973 in eastern Montana

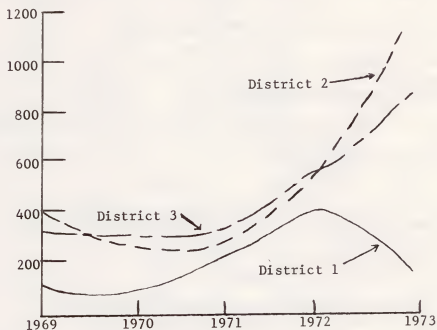
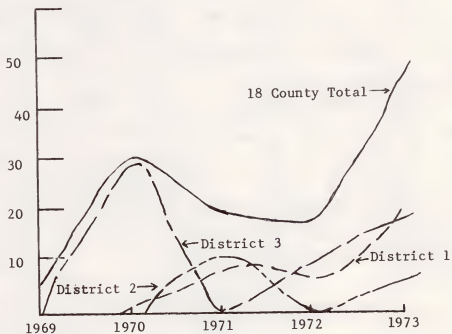


Figure 4 Number of Requests for Service for Predator Control, Fish and Wildlife Service for Cattle Losses 1969-1973 in eastern Montana



Department of Livestock

The Department of Livestock conducted a study of the primary conditions affecting the Montana sheep-raising industry beginning in November 1972. One study included a twelve year summary (1961-1972) of 19 counties in Montana. In December of 1972, questionnaires were mailed to sheep growers, past and present. The mailing list was obtained from county assessors. The Department of Livestock concluded the five most important conditions affecting the sheep industry over the past twelve years (as expressed by 33% of the sheep growers) in the 19 largest sheep producing counties are as follows in order of response:

1. Predators
2. Prices
3. Inadequate Help
4. Weather
5. Lambing Complications

(See Appendix 6)

The Department also concluded from a 1972 state-wide survey that the five most important conditions affecting the sheep raising industry as expressed by 50 percent of the sheep growers were:

Eastern Montana

1. Predators
2. Prices
3. Weather
4. Lambing Complications
5. Disease

Montana

1. Predators
2. Prices
3. Weather
4. Disease
5. Lambing Complications

(See Appendix 6)

Montana Wool Growers

At their December 1973 convention, the Montana Wool Growers Association conducted a survey comparing losses in 1972 to losses in 1973. As of December 27, 1973, 337 surveys were returned. Total predator losses increased from 8,732 to 13,845 or a 58.5 percent increase. Total losses from the coyote increased from 6,878 to 11,747 or a 70.7 percent increase.

Garfield County Predator Survey

The Garfield County Committee for Rural Development conducted a predator survey in the fall of 1972 and 1973 for their county. The 1972 survey showed a 6.7 percent sheep loss to predators (25% return) as compared to 14.0 percent sheep loss in 1973.

PREDATOR	1972		1973	
	SHEEP LOSS	% of TOTAL SHEEP LOSS	SHEEP LOSS	% of TOTAL SHEEP LOSS
Coyote	1339	8.7	2584	91.8
Bobcat	54	3.5	7	.25
Eagle	102	6.7	135	4.8
Other	42	2.8	89	3.16

The 1973 survey showed a .3 percent cattle loss due to predators. The 1974 EDAEM survey showed a comparable loss of .26 percent cattle lost to predators.



PREDATOR CONTROL

Predator control can be rationally approached by three methods: prophylactic method, problem animal method and repellent method.

The prophylactic method decreases the population of the problem species. This method assumes that livestock damage is directly proportional to the number of predatory animals. That is, as the population of the predator species increases, livestock losses will also increase. Lowering the predator population is viewed as preventing damage.

The problem animal method involves only controlling the individual problem animal. Within the last five years, Montana's control program has tended toward this approach. If this method is used the rancher must wait until there is damage. The method has not been used very much since most control methods have been developed under the prophylactic concept.

The repellent method tries to prevent damage by keeping the problem species from contacting livestock. This method uses odors, sounds, lights, mechanical barriers and management practices to prevent the predator from getting a "taste" of livestock. This method is new and has few devices that are positively effective. Some of these methods have been tried by producers to a limited extent. Research might be the key. Of the three methods, this method holds the most promise for complete acceptance and at the same time effectiveness.

Presently there is no single method of control that will work under all situations. In choosing a control method a primary consideration must be the animal's adaptability. If any one method is used too long, the animal may adjust and livestock losses will continue. The answer may be to keep changing the control method or repellent.

Predator Control

Traps employed for predator control should be treated to remove the factory oil finish. They should be boiled in water with a natural staining material such as wood chips from oak, maple, hemlock, etc. The traps should set overnight in the water. This procedure should be repeated before and after use to keep the traps clean and odor free.

A strong mesh fence, with an electrified barb wire on top, will protect poultry and pigs from most predators. The fence should be buried 12 inches in the ground. A fence which slants outward at the top will discourage climbing.

There are 8 predator species in eastern Montana that cause economic losses. Each predator is listed, with the type of damage and control methods.

COYOTE Canis latrans

Damage - lambs, sheep, calves, cows, pigs, turkeys, chickens and sometimes colts.

Solution - See methods for coyote control after the other predators are listed.

DOG Canis species

Damage - lambs, sheep, calves, pigs, chickens, and poultry. Dog damage increases near towns.

Solution - Similar to coyote but should be easier to catch or kill. Montana has a law covering dog damage.

"46-1916. (3417.15) Killing of dogs destroying or injuring stock — notice to owner. Any dog, whether licensed or not, which, while off the premises owned or under control of its owner, shall kill, wound or injure any livestock not belonging to the master of such dog, shall be deemed to be a public nuisance and may be killed forthwith by any person, or the owner, when notified, shall kill such dog within twenty-four (24) hours and if he fails to do so an officer may be notified and shall kill or cause to be killed such dog; provided, that nothing contained herein shall apply to any dog acting under the direction of its master, or the agents or employees of such master."

"46-1917. (3417.16) Liability of owner for damages by dog. When it has been proven that a dog has killed, wounded, or injured any livestock, the owner of such dog shall be civilly liable to the owner of such livestock, in a civil suit for damages in a sum equal to the amount of the damages incurred." (Montana Livestock Commissione 1970:105)

RED FOX Vulpes fulva

Damage - lambs, sheep pigs, turkeys, chickens.

Solution - Hunting: aerial (more effective for coyotes), ground hunting by calling (good) or tracking;

Predicides: sodium cyanide (M-44), 1080 (bait), strychnine (bait);

Traps: double spring #2 or 3 jaw 4 3/4 and 5 1/2 inches, jump trap #2 or 3 jaw 5 3/4 and 6 1/2 inches, coil spring single #2 jaw 5 5/8 inches (Oneida 1974)

BOBCAT Lynx rufus

Damage - lambs, sheep, pigs, turkeys, chickens

Solution - Hunting: aerial, ground calling (very good), tracking;

Predicides: sodium cyanide (M-44), 1080 (bait), strychnine (bait);

Traps: Steel traps are the most effective way of taking bobcats (Giles 1971:509). Double spring #3 jaw 5 1/2 inches, Oneida newhouse #3 jaw 5 1/2 inches (Oneida 1974).

EAGLE, GOLDEN Aquila chrysaetos, BALD Haliaeetus leucocephalus

Damage - lambs, chickens

Solution - No control methods will be listed. Both the golden and bald eagle are protected by federal law. If an eagle is causing damage to livestock, contact the U.S. Fish and Wildlife Service and the Montana Department of Fish and Game.

STRIPED SKUNK Mephitis mephitis

Damage - chickens (and eggs), turkeys. Skunks are carriers of rabies and several outbreaks have occurred in eastern Montana. Of all the mammals, the skunk is the most dangerous carrier.

Solution - Hunting: Shooting is usually not effective in controlling skunk populations.

Predicides: Strychnine treated eggs are the most effective method of skunk control. Strychnine eggs can only be used in areas with an existing or potential rabies problem. Prior to use, permission must be granted by the Environmental Protection Agency to the Department of Livestock to carry out a control program. The eggs are placed in skunk habitat. All eggs are destroyed at the end of the control program (Ken Seyler, personal communication). The Department of Livestock conducted a rabies suppression program from June 6 to October 31, 1973 in northeast Montana. The program cost \$10,000.00. 415,720 acres were covered with an average of one strychnine egg per 100 acres. Figures from Sheridan County showed a decrease in the skunk population of 86 percent (Cheney 1974:20-21).

Traps: Single spring #1 or 1 1/2 jaw 4 and 4 3/4 inches, jump trap #1 or 1 1/2 jaw 4 1/2 and 5 1/8 inches, stop loss trap #IVG jaw 4 inches, jump stop loss trap #1JG jaw 4 1/2 inches, coil spring #1 1/2 or 1 1/2D jaw 4 7/8 inches (Oneida 1974).

RACCOON Procyon lotor

Damage - chickens (and eggs), turkeys, some crop damage.

Solution - Hunting: Hunting is not effective since most of the raccoon activity is at night;

Predicides: Poisoning is the most effective method for raccoons.

Strychnine treated eggs can be used, but only the Department of Live-

stock can administer such a control program.

Traps: Trapping is the second best method of control. There are three types of trap sets. The "dirt hole set" is located 1/2 inch below the ground next to a trail and covered with sifted dirt. The trap pan is protected with a canvas cover. A hole 3 to 4 inches deep slanting away from the trap is dug. Any meat or fish can be used as bait. The trap should be wired to a stake or drag. A "cubby set" is a three-sided enclosure with a trap set near the entrance. The one to two feet walls are constructed of small logs and the top is covered with sticks. The bait is placed behind the trap. The trap should be secured to a drag not a stake. "Water sets" are placed five to six inches from the shore in the water of a stream, marsh or lake. The jaws and chain are covered with a fine silt. A bright shiny object is attached to the trap pan.

Traps - Double spring #2 jaw 4 3/4 inches, jump trap #2 jaw 5 3/4 inches, coil spring trap #1 1/2 or 1 1/2D jaw 4 7/8 inches (Oneida 1974).



Single Spring
Nos. 0, 1, 1 1/2



Oneida newhouse



No. 2, 3, 4—Double Spring



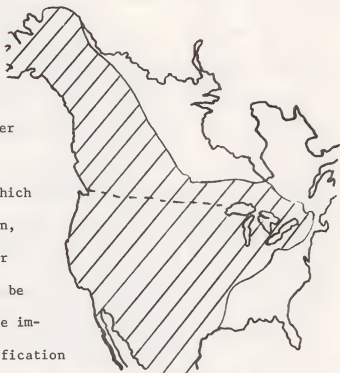
LIFE HISTORY OF THE COYOTE Canis latrans

The coyote can be found in western and central North America from Alaska to Quebec and southward to Mexico. In recent years he has expanded eastward (Lechleitner 1969:168).

Unlike many wildlife species which have declined with the advent of man, coyote populations have increased or remained stable. This increase can be attributed to many factors, the more important ones being: 1) habitat modification brought about by man's presence such as the cutting of forests, 2) the extirpation of the wolf, Canis lupus, and other carnivores by man from most of the original range thus allowing the coyote to replace them (Evanson 1967:70), and 3) the coyote is very adaptable to change. In spite of heavy trapping and poisoning, the coyote still survives in good shape. I do not think that the coyote will ever become an endangered species regardless of what man does.

In settled areas the coyote is mostly nocturnal partially due to the unrelenting hunting pressure by man. His shy and secretive habits keep him from being spotted, thus enforcing people's claims that the coyote population is down. Even if the coyote is seen in daylight, a hunter can seldom get within rifle range. Coyotes have three well developed senses; sight, smell and hearing (Thomas 1971:87).

The coyote's den is selected according to the habitat. It may vary



(Burt 1964:74)

from a hole in the ground, a crevice in rocks or in a rotten log (Lechlietner 1969:170). A den located on the plains is often dug by the coyote. Dens are about 2 1/2 to 3 feet in diameter. They are always kept clean. Wherever the coyote makes his den, it is always well concealed (Thomas 1971:89).

The mating season occurs in the latter part of February and early March at which time the female comes into heat for a four day period. Hybridization sometimes occurs between the domestic dog and coyote. The offspring display intermediate characteristics of both parents. These dog-coyotes are fertile (Thomas 1971:87). The gestation period is 60-65 days. The pups are born in mid April. The litter size varies from 3-10, but averages 5 (Thomas 1971:89). Man's predator control programs have sometimes decreased coyote densities. A low population density allows more food per coyote, thus coyote litters have sometimes increased to 12 in response to this abundant food supply (Evanson 1967:72). The young are born blind and helpless and their eyes remain closed for 8-9 days. At seven weeks the pups start eating solid food. At this time the parents teach the pups to hunt, often starting with grasshoppers. In the fall, the young coyotes are on their own. The coyote's life span is twelve years (Thomas 1971:89).

During April and May the female coyote is busy caring and providing food for her pups. During this time the coyote sometimes turns to domestic animals. This is also the time that lambs and calves are most vulnerable. If these pups can be eliminated, then predation might stop.

Coyotes will eat anything that is readily available. They usually limit their hunting to a ten mile route (Burt 1964:74). Summertime diets consist mainly of gophers, mice, rabbits and ground nesting birds. They will also eat grasshoppers, crickets, beetles, nuts, mushrooms and vegetables (Thomas 1971:88). One California study showed that rodents and rabbits comprised

90 percent of their diet (Evanson 1967:76-77). One researcher, Sperry (1941) found the coyote's diet to consist of 33 percent rabbits, 18 percent rodents and 13.5 percent domestic livestock. The composition of a coyote's diet does not necessarily represent what the animal kills.

Since such a high proportion of his diet is rodents and rabbits, one might conclude that coyotes control rodent numbers. This is not always the case. Rodents have a higher biotic potential, therefore rodents can expand faster than the coyotes can control them. There is some evidence that coyote populations are cyclic every seven to twelve years which might or might not follow rodent population cycles (Dingell 1973:210). When food is scarce (winter-time) coyotes will often form small packs to hunt large mammals. When a coyote attacks, he usually goes for the throat. Healthy, vigorous



The Wily Coyote (Courtesy Montana Department of Fish and Game)

wild animals usually will not be taken. In recent years, coyotes have not had a significant impact on deer and antelope populations in eastern Montana (Keith Seaburg, personal communication). Sometimes the coyote's natural prey animals become scarce and livestock may become prey. Since coyotes eat what is available, he can be an asset in reducing rodent populations or a detriment when only livestock are accessible (Evanson 1967:76). When injured, the coyote will go after the easiest prey available. Unable to pursue wildlife, the crippled coyote will sometimes depend on man's livestock for food. Some healthy animals also prey on livestock.

The coyote has very few natural enemies. The most important decimating factor is weather. Snow reduces the food supply, exposes him to the cold, and makes him a good target for a hunter (dark color against snow). Man is the second most serious limiting factor. Parasites and disease play a small part in coyote mortality. Only rarely does a coyote population contract rabies. Rabies is more likely when coyote populations are high. The real danger lies when rabies is spread to domestic dogs. Coyote pups are subject to attacks by great horned owls, golden eagles and bobcats (Thomas 1971:90).

These methods are not all recommended for use.

METHODS FOR COYOTE CONTROL

Direct coyote control should be:

- 1) Economical
- 2) Selective for problem animal
- 3) Humane for all animals taken
- 4) Effective for target species
- 5) Safe for humans and livestock
- 6) Not result in environmental degradation
- 7) Acceptable to the majority of the public

I. DIRECT METHODS

A. Lethal Techniques

1. Hunting
 - a. Aerial hunting
 1. airplane
 2. Helicopter
 - b. Ground hunting
 1. road hunting
 2. den hunting
 3. sport hunting
2. Chemical Toxicants
 - a. 1080, sodium monofluo acetate
 - b. sodium cyanide
 - c. strychnine
 - d. thallium

3. Traps

4. Snares

5. Biological control

B. Preventive Techniques

1. Increase human presence
2. Stimulate coyote senses
 - a. chemical repellents
 - b. lights
 - c. sound
3. Use sheep dogs
4. Fences (coyote proof)
5. Reproductive inhibitors
6. Live trapping

II. INDIRECT METHODS

A. Management

1. encourage wildlife for coyote food base
2. increase flexibility to move animals when predation occurs
3. prohibit livestock in chronic problem areas
4. more protection at time of lambing and calving
5. more herdsman
6. hire a trapper
7. improve range condition
8. breed animals to take care of themselves

B. Economics

1. federally subsidized sheep herders
2. tax incentive
3. improving efficiency of central programs
4. increase value of coyote p lts
5. establish a bounty system

C. Education

1. training program for control agents and ranchers in control methods
2. encourage sport hunting
3. increase public awareness of livestock losses
4. increase the public's understanding of the coyote's life history and its role in the ecosystem

DIRECT METHODS

LETHAL TECHNIQUES

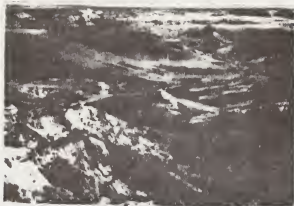
HUNTING

AERIAL

Airplane - A pilot and gunner can be very effective in shooting coyotes. The gunner is equipped with a 12 gauge shotgun and shoots during several passes. If the coyote escapes he will be especially difficult to approach a second time. Aerial hunting is more successful if there is communication with ground personnel. A ground crew fixes the location of the coyotes by calling (record, sirens, predator calls) and then relays the information to the aircraft pilot. Shooting is more effective before plants leaf out. The airplane is very effective on flat open country. The helicopter is the most effective aerial tool.

If a trouble request is responded to promptly, the problem animal will probably be removed. With experienced pilots and gunners, the coyote is killed very fast with little pain.

The effectiveness of an airplane is limited by weather (wind, rain, visibility), light, rough terrain and the pilot and gunner's accuracy and experience. The cost of aerial hunting is expensive. In an accelerated program, April 17 to September 30, 1972 the Bureau of Sport Fisheries and Wildlife averaged \$31.64 for each adult coyote taken by fixed-wing aircraft in region 1 (Region 1 includes Montana, Alaska, Washington, Idaho, California, Oregon and Nevada). They averaged .64 adult coyotes per hour and the aircraft cost was \$19.49 per hour (Dingell 1973:353). The aircraft cost in Montana now is approximately \$25.00 per hour including pilot and aircraft costs (Paul Bunke, personal communication). To hunt any animals from the air a permit



Rough terrain makes aerial hunting difficult
(Courtesy Soil Conservation Service)

must first be obtained from the Department of Livestock (Cheney 1974).

Helicopter - The helicopter has all the advantages of the airplane and also can be used in rougher terrain. Altitude and cost prohibit its wide spread use. During the summer of 1972, the BSWF conducted an accelerated control program in 14 western states. In region 1 choppers averaged \$125.00 per hour, taking an average of 1.87 adult coyotes per hour and the cost per adult was \$66.85, twice that of the airplane (Dingell 1973:353). Analyzing data from 14 states the chopper was 93 percent more effective but 214 percent more expensive than the airplane. Average cost for all aircraft combined was \$61.01 per adult coyote taken (Dingell 1973:351). Costs seem to vary quite a bit according to terrain. The Bureau conducted an operation in the Bridger National Forest in Wyoming during the summer of 1972. This area had very rugged terrain. The cost per coyote by choppers amounted to \$250.00 per coyote taken (Dingell 1973:55).

GROUND

Road - Road hunting involves shooting coyotes after being spotted from a moving vehicle. The car is kept moving with one man getting out on the

opposite side. When the car moves out of the way the now positioned shooter fires on the coyote. The moving car is supposed to keep the coyote from becoming alarmed. If the car is stopped abruptly the coyote will take off immediately. The plan sounds good but seldom works. Sometimes the coyote will run at the sound of an approaching vehicle. A running coyote (40 mph; Burt 1964:75) is a very difficult target. Paul Bunke (personal communication) has commented that this technique might do more harm than good. A coyote that is harassed by man will be harder to take the next time.

Den - Tracking or following a coyote to his den is no easy task. Once at the den, the pups can be destroyed very humanely by shooting. Killing the pups accomplishes two goals: 1) decreases the coyote population, and 2) eliminates the necessity of food gathering done by the adult for the pups which have sometimes forced the coyote to prey on livestock. For general coyote population reduction more than one den must be destroyed. A Bureau study of control methods covering seven western states in 1971 showed that the denning method took 20.2 percent of all the coyotes taken with 15.4 percent of the total funds (Miner 1974).

Sport - Sport hunting is the taking of coyotes by shooting, either by tracking the animal or calling him to you.

Tracking the coyote is very difficult. Proper camouflage is essential. A look-like-a-leaf suit in the summer or pure white in the winter must be worn. The stalker should be upwind of the coyote at all times. When the coyote is in range the shot is made.

Conceivably, coyotes could be hunted by a trained dog pack. Either the dogs will corner the coyote waiting for the marksman or the dogs might kill the coyote. The dogs must be fast and have stamina. In the summer grey-

hounds could overtake a coyote easily. Even though the coyote is a wild animal he stands little chance against several dogs.

Calling predators to the hunter is more effective than tracking. A predator call is often used to lure the coyote closer. It simulates the distress call of a small mammal such as a rabbit. When the coyote hears it he pictures an easy meal. The call must be perfect to fool the wily coyote. Predator call records have been developed, but some claim they don't have the quality necessary to lure a coyote. Recently it has been discovered that coyotes will respond to sirens, such as a police siren. It seems that the coyote is trying to communicate with it. The marksman must be well camouflaged. He should be positioned so he has a clear shot in any direction or in such a position so that the coyote can approach from only one direction.

Usually hunting is done in the winter when the coats are prime and the hunter can sell the hides. The coyote is easier to spot and track when there is a snow cover.

For a comparison of control methods see Appendix 7, 8, 9.

CHEMICAL TOXICANTS

SODIUM MONOFLUORACETATE 1080

Sodium monofluoracetate began replacing strychnine as a predicide in 1947. As a result of the executive order banning the use of chemical toxicants on federal land and the E.P.A. restrictions on poisons, 1080 has not been used since 1972.

Sodium monofluoracetate (1080) is a white, odorless, organic salt similar to flour and almost tasteless. 1080 is not readily absorbed through the skin. There is no highly effective antidote (Atzert 1971).

Ten-eighty poisoning is followed by a latent period of seldom less than two hours (the time is related to it's biochemical action). It interferes with the final process of converting food to energy in animals. This causes a loss of cell function, eventually manifested in organ system disorders. Deaths result from cardiac and/or central nervous system failure (Atzert 1971). There is very little data on the time it takes for death to occur since the coyote usually can not be observed. Coyotes probably die within 12 hours. If the poison dosage is increased, death might be faster, but secondary poisoning would be more likely (Paul Bunke, personal communication).

The predicide is placed in eviscerated carcasses (domestic or nongame animals, 50-100 pounds) at an application rate of 1.6 grams of 1080 per 100 pounds of bait. This low dosage is used to prevent secondary poisoning. See Table 5. The carcasses are placed in areas of maximum coyote use. The Bureau of Sport Fisheries and Wildlife had one bait station per township. The baits are distributed late in the fall and picked up as early in the spring as practical. Written agreements, warning signs and fastening the

bait down are further precautions in preventing accidents or injuries to nontarget species (Atzert 1971).

Good data on 1080's effectiveness is lacking. However, there are some indirect measures of 1080's effectiveness.

"Since the decline occurred about the time "coyote-getters" and especially 1080 came into general use, the possibility is that these techniques used in "prophylactic" control have been major population depressants. And since, among the seven states examined, the degree of decline appears to be roughly proportionate to the number of 1080 stations used (Figure 5), the suspicion emerges that this toxicant may have been the effective control tool (Cain 1972:42)."

Figure 5 might indicate that the further north the 1080 control program, the more effect it has on coyote populations. The quantity and variety of foods and the lack of severe winters in southern regions usually provides a constant food supply for the coyote. In the north, food is limited and the coyote is more likely to consume baited carcasses (especially wintertime).

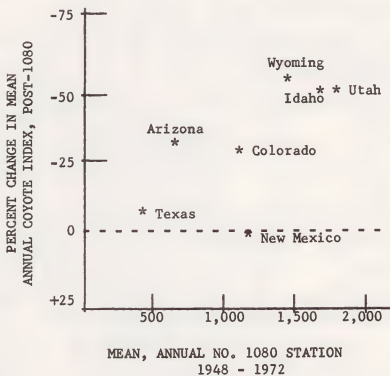
The correlation between the coyote population density and the level of sheep losses is not as strong as 1080 and population suppression, however, it does show a general trend of increased losses with more coyotes. The effectiveness of any control technique is clouded by the difficulty of identifying predator losses and estimating the amount of damage that could be prevented by using a particular method. There is data on both sides.

"The data collectively suggests a reduction both in coyote numbers and sheep losses as a result of so-called "prophylactic" or generalized population control" (Cain 1972:49).

"Evidently, 1080 is generally concluded to be the most effective chemical used in coyote control, yet data for four important western states show no significant difference in total losses before and after the introduction of this poison" (Cain 1972:111).

The inhumane death caused by 1080 and some possible secondary poisoning is 1080's major pitfalls. Death is associated with severe spasms before

Figure 5 Change in Mean Annual Coyote Index (kill/Man-Year) as a Function of Amount of 1080 Used (Cain 1972:44).



falling into convulsions. If the coyote receives a sublethal dose, the time of recovery is very painful.

Since 1080 is an emesis (causes vomiting) there is a possibility of other animals consuming the vomitus.

At the time of death 40 percent of the 1080 administered is found in the internal organs, thus concentrating the 1080 (Atzert 1971:28). This poses a hazard to animals who feed upon these organs. Some nontarget species may be poisoned but not killed. These animals may have a painful recovery or die as a result of lethargy or ataxia (Evanson 1967:158). In controlled experiments some animals (badger and raccoon) were left with nervous disorders (Evanson 1967:157).

Nontarget animals can be poisoned from the 1080 bait, the vomitus or other animals that have died from 1080.

Sodium monofluoracetate is selective for canines meaning that other animals must consume a larger quantity of bait to receive a lethal dose. (Table 5). As an example, golden eagles usually consume the internal organs first where 1080 is normally concentrated.

"To obtain an LD₅₀ (1.25-5.00 mg/kg) of sodium monofluoracetate from a secondary source such as coyotes, a 7 pound golden eagle would have to consume the internal organs of from 7 to 30 coyotes killed by sodium monofluoracetate--assuming the coyotes ingest a LD₅₀(0.1 mg/kg) and do not excrete, detoxify, or regurgitate any of the toxicant..." (Atzert 1971:19).

Animals can excrete 1080 and metabolize it to nontoxic forms. In this way there is often no build up in the body.

"Animals can metabolize sodium monofluoracetate to non-toxic metabolites and can excrete monofluoracetate as well as its toxic metabolite fluoracitrate. Tests with rats administered 5.00 mg/kg of sodium monofluoracetate show that they excreted in the urine up to 32 percent of the amount prior to death, with non-toxic metabolites constituting 73 percent of the amount excreted." (Atzert 1971:29).

Table 5 LD₅₀, Average Weight and Amount of Properly Treated Coyote Bait (1.6 grams of 1080/45.4 kilogram of bait material) that Selected Species Must Consume in order to obtain a Median Lethal Dose (Atzert 1971:15).

Species	¹ LD ₅₀ mg/kg	Average Weight lbs.	Amount of Properly Treated Coyote Bait Containing LD ₅₀ oz.
Coyote	0.1	30	1.4
Cat (Domestic)	0.2	3	0.3
Fox	*0.3	12	*1.6
Bobcat	*0.66	22	*6.6
Bear	0.5-1.0	300	68.0-136.0
Mink	#1.0	3	#1.4
Marten	#1.0	3	#1.4
Badger	1.0-1.5	19	8.0-13.0
Magpie	0.6-1.3	0.5	0.1-0.3
Man	0.7-2.1	150	47.6-142.8
Golden Eagle	1.25-5.0	7	4.0-15.9
Hawks	#10.0	2.5	#11.3
Great Horned Owl	#10.0	3.5	#15.8
Black Vulture	15.0	5	34.0
Turkey Vulture	*20.0	6	*54.0

(*) indicates less than

(#) indicates approximately

(1) LD₅₀ is a statistical estimate of the dosage that would be lethal to 50 percent of a very large population of a species.

Concerning human safety there have been no human fatalities resulting from the use of 1080 to control coyotes and field rodents (Atzert 1971:28).

The Bureau conducted its 1080 program in a manner which minimized the hazards to nontarget species. Some of the precautions included:

1. coyote bait treated at 1.6 grams/100 lbs. of bait, reducing danger to other species
2. baits being placed in areas having minimum use by nontarget animals
3. low density bait placement (1 per township) excludes contact by animals with small home ranges
4. bait placements were made late in the fall and bait pickup as early in the spring as possible. Winter 1080 bait stations will protect hibernating carnivores and scavengers and migrant wildlife which are not in the area
5. the baits were securely fastened to immovable objects preventing relocation of bait
6. warning signs were posted on trails and roads leading to the bait site to prevent human and domestic animal injury
7. written agreements between ranchers and the control agents stating the positions of the 1080 stations averting human and domestic animal injury

Populations of nontarget carnivores have not measurably decreased near Bureau control operations (Atzert 1971:27-28).

For a comparison of predicide use see Appendix 10.

SODIUM CYANIDE

Sodium cyanide is a water-soluble white solid which reacts with acids forming hydrogen cyanide gas. This gas is one of the most toxic and rapidly acting toxicants. Sodium cyanide is the most humane toxicant. Death may result from ingestion of low dosages (300 micrograms/liter of air). Usually victims die rapidly from respiratory failure or recover very quickly. There is no true effective antidote (Dingell 1973:97).

The coyote-getter was the first device that used sodium cyanide.

"It is a mechanical device which expels sodium cyanide and consists of a shell holder wrapped with fur, cloth, wool, or steel wool; a firing unit; a .38 cal. shell containing the sodium cyanide; and a 5-7 inch hollow stake. The stake is driven into the ground,

the firing unit is cocked and placed in the stake, and the shell holder containing the cyanide shell is screwed onto the firing unit. A fetid bait, usually made from fish, brains, or blood, is carefully spread on the shell holder. An animal attracted by the bait will try to pick up the baited shell holder. The cartridge fires when the animal pulls up on the shell holder and the cyanide is blown into the animal's mouth. The noise (similar to a .22 cal. discharging), and the wad hitting the roof of the animals mouth frightens the animal, causing it to run from the device" (Giles 1971:512).

The wad from the cartridge has enough force to break the skin or damage an eye. In 1969, the M-44 replaced the coyote-getter. The cyanide is ejected by a 40 pound spring instead of an explosion. This makes it safer for the handler and innocent parties. Weather does not seriously affect its operation. The M-44 is loaded with 12 grains of sodium cyanide, tracerite and an anti-caking chemical (Bacus 1969). The present cost of the M-44 is \$5.65 (Ken Seyler, personal communication).

Robinson (1943) reports that coyotes traveled an average of 73 yards from the coyote-getter. In one study, 584 coyote-getters were discharged by coyotes and 419 of the animals were found. The rest were either killed and not found or escaped injury. The average recovery distance of the M-44 was less than 50 yards and the recovery percentage of the carcasses was 71 percent (Bacus 1969).

The M-44 is fairly selective for coyotes but nontarget species can find it. It can be more selective if only used in areas of known coyote predation and removed after the problem animals are killed. Once the M-44 is triggered, it must be reloaded. Warning signs should be posted near the site. Although the M-44 is more effective in cooler weather, it may be dangerous to use in the fall due to the influx of hunting activity. On an annual basis, the M-44 took just as many coyotes as the steel trap (Paul Bunke, personal communication). The old coyote-getter seemed to decline in

effectiveness when it was used.

"Government trappers point out that "coyote getters" (a device that expels cyanide crystals into the mouth of an animal which tugs at the bait) declined in effectiveness within a decade of their introduction. The decline has been attributed to a coyote behavioral adaptation" (Walcheck 1972).

Presently the Fish and Wildlife Service has the authority to use the M-44 under emergency conditions on private land. The Montana Department of Livestock is now setting up an experimental M-44 program in selected counties (approved by the Environmental Protection Agency). In the 18 eastern counties only Phillips, Dawson, Garfield, Powder River and Carter counties intend on implementing the program. Presently only eight of the 21 counties in Montana authorized for this program are participating (Ken Seyler, personal communication).

For a comparison of predicide use see Appendix 10.

STRYCHNINE

Strychnine is an extremely bitter-tasting white crystal. It is very toxic to most mammals and birds except gallinaceous birds.

Strychnine interferes with neural processes, causing exaggerated muscle contraction, violent convulsions and culminating in respiratory failure. Thirty mg. is fatal to humans. Strychnine can be a chain killer. There is no true effective antidote (Dingell 1973:97).

Strychnine baits can be 1/2 to 1 inch in diameter made from hamburger, lard or tallow. Sugar can be mixed in to offset the bitter taste. The baits should be located near travel lanes or other frequented areas. Warning signs should be near the bait areas (Giles 1971:515). Strychnine in carcasses are easier to keep track of. In the past, federal agents have dropped hundreds of strychnine injected suet balls from the air in rodent control

operations (Evanson 1967:153). Strychnine is usually used in the summer since it will not degrade in the environment during cold weather.

The effectiveness of strychnine baits can be illustrated by a 1957 annual report of the United States Bureau of Sport Fisheries and Wildlife in Wyoming (Haskell 1973:236).

Number of Baits Placed	25,500
Number of Predators Poisoned	64
Number of Baits Destroyed	3,300
Number of Baits Per Animal	347
Net Baits	22,200

For a comparison of predicide use see Appendix 10.

THALLIUM

Thallium is an odorless, tasteless white powder. The poison can be absorbed through the skin. Thallium is stable and will remain indefinitely in the soil. The poison is orally toxic and so deadly that handlers must wear masks. It is toxic to most animals. There is a tendency for thallium to be stored in the body and with continued exposure, a build up will result in organ damage or death. Secondary poisoning to non-target animals is a likely possibility (Dingell 1973:98).

Thallium works on the central nervous system, resulting in depression, ataxia and respiratory distress. The kidney, liver and alimentary canal are also affected. Death is slow and painful (Evanson 1967:155). Large doses of thallium may prove fatal within 24 hours. Most animals consuming this toxicant in small but lethal amounts die within two to five days. Several weeks for recovery is required for sub lethal doses. During this period, partial disability, an emaciated condition and loss of hair combine for a painful experience (Cain 1972:69).

Thallium is placed in baits much like 1080. From 1945 to 1956, thallium was claimed to be the most effective coyote control method (Dingell 1973:481).



TRAPS

Steel leg-hold traps can be used with or without bait. A blind set (no bait) is usually placed in the travel lane or area where the coyote is frequently found. A baited set has the animal's food or some other lure such as urine or musk. Traps are placed so that it is 1/2 inch below the surface. It should be attached to a firm anchor or drag. The pan is covered with cloth and dirt is used to cover the trap. Trapping success is largely due to the experience of the trapper. A good trapper can take more coyotes and less nontarget species than inexperienced ones. Many coyotes have become "trap wise", with some even stealing the baits. Recommended trap sizes are double spring #3 jaw 5 1/2 inches, jump trap #3 jaw 6 1/2 inches, Oneida newhouse #3 or 4 jaw 5 1/2 and 6 1/2 inches (Oneida 1974).

One way of increasing the humaneness of a steel leg-hold trap is to attach a tranquilizer tab. However, the Environmental Protection Agency and the Food and Drug Administration have restrictions on tranquilizers, so they are difficult to get.

For a comparison of traps with other methods see Appendix 7, 8, 9.

SNARES

Snares may be effective tools for coyote control. There are two types of snares; body and foot snares. The body snare is placed at a "crawl" under a fence, a den entrance, on a trail or narrow passage. When the coyote enters, his head passes into the loop and the cable is pulled tight. The foot snare, when sprung, draws a cable tight around the coyote's foot (Giles 1971:511).

BIOLOGICAL CONTROL

I define biological control as an organism other than man that adversely affects the coyote's behavior or health. An example of a biological control is a virus, myxomatosis, which is fatal to rabbits. This virus was introduced to Australia to decrease the rabbit population. Presently the coyote has no effective predators except for man. If some biological control could be found, it would be self regulating. This is a good area for research.

P R E V E N T I V E T E C H N I Q U E S

USE SHEEP DOGS

Sheep dogs have been used for hundreds of years to help round up and protect flocks. If a coyote has to fight off a dog, he may not attack the sheep. A sheep dog could also warn the herder so he could take action. Stray sheep might be prevented if a dog was keeping them together.

FENCES

Coyote proof fencing could be installed to protect livestock. The fence is made of mesh wire 51 inches high with one strand of barb wire on top. An additional wire is fastened near the ground on the opposite side of the post. The cost of fence is expensive (Evanson 1967:29). If the fencing is done on federal land, the government may pay for part of it. The advantage of a coyote proof fence is that there is something to show for your expenditure. Each year additional fence could be added. The fence might be constructed with funds that would otherwise pay a herder.

REPRODUCTIVE INHIBITORS

If anti-fertility agents could be administered to coyotes, the population might not increase.

The baits are 1/2 ounce tallow drops with 100 milligrams of stilbestrol. Baits are placed near travel lanes, water holes and scent stations. The proper timing of bait placements is essential to the success of the chemical (Balser 1964). Unfortunately not all coyotes will find the bait and it is sometimes destroyed by weather.

LIVE TRAPPING

Live trapping and transport would work if a method could be devised to

prevent the coyote from coming back and/or keep other coyotes from moving in. I don't think that this is possible in a problem area. Where would you take the coyote? The time and cost would not justify the livestock saved, assuming your live trapping was successful.

STIMULATE COYOTE SENSES

Most strange odors, lights or sounds will discourage coyotes. By changing each particular sound, odor or mixing the three, the effective time can be extended. If the coyote associates any one of the techniques with humans, pain or an unpleasant experience the protection will last longer. Coyotes will probably adjust to any method used continually. Unfortunately, these methods are most effective in smaller areas.

Chemical Repellents - Chemical repellents are perhaps the most desirable form of predator control. The major problem is finding an effective long lasting chemical. Repellents would prevent coyote damage. A rancher would not have to wait until he loses livestock to get help as well as supporting a costly control program. The only expense is the cost of the application and the chemical. Each animal would be sprayed or have an odor device attached. If the repellent was strong enough, not all the animals would need the chemical. An odor could also "surround" the flock from some kind of device.

Spraying sheep with a repellent has been tried by Phil Wolff and is reported in the December 1973 issue of the Montana Woolgrower magazine.

"Injecting one of the brightest notes of optimism was Phil Wolff of Rapid City, South Dakota, who gave a formula he has used to eliminate, at least for the time being, all losses from predators. Giving no guarantee, Wolff, who is the son of a prominent sheepman, Otto Wolff, said a mixture sprayed on the sheep has reduced their losses to less than 1 percent from 15 percent the year before. He said he did not know how long this would be effective, but he was offering it to other sheep producers who might want to try it.

The sheep repellent consists of: For 250 ewes or 350 lambs: 2 quarts Malathion; 2 quarts Toxophene (60%); 1 gallon Lanolin based paint; 1/2 pint plyac. Mix these ingredients thoroughly in 100 gallons of water. This mix should be sprayed on sheep once a year. It will not damage the fleece. It has cut Wolff's predator losses from 15% to less than 1%."

While this repellent is effective, there may be some concern that slaughter houses will not accept sheep if they are sprayed.

Another method involves attaching a repellent rubber collar to the animal. There has been some field trials conducted in western Colorado using this device. Results of these trials showed some decrease in losses in one herd out of three. Three chemicals were tested, cinnamaldehyde, cyclo-hexyl mercaptan and naphthalene. The chemicals were dissolved in a petroleum base and impregnated into sponges which were attached to neck collars. The final results of these tests are not yet available (Dale Wade, personal communication).

Chemical repellents could also be attached to a fence to keep coyotes out. Charles Conley of Otter, Montana has developed such a fence. He has associated a shock with a scent.

"A livestock protection method of providing an enclosure fence with an electric shock wire and an odoriferous, noxious repellent whereby a predator simultaneously receives an electric shock while sensing the repellent. Flexible stripping material for attachment to the enclosure fence is disclosed which provides a trough for holding the repellent, an insulation lip for holding the electric shock wire, and a deflector for holding weeds and grasses away from the electric wire."

This method might not be feasible on large ranges.

One problem with repellents is that under continued exposure to a repellent, coyotes may become accustomed to the odor and attack any way. This could possibly be overcome by changing the repellent or associating something unpleasant (shock) with the odor.

Presently there are no universal repellents that will work on all

coyotes indefinitely. I think research will find several repellents that will be effective.

Sound - Most strange sounds will keep coyotes away. Bells on animals will annoy a coyote if nothing else. A noise apparatus (tape recorder and loud speaker) having an irregular noise or changes of sounds might work temporarily. A constant sound will be adopted to quickly. Ultrasonic transmitters attached to sheep could emit high pitched sound to "blast" the ears of coyotes (McCoy 1974:183).

Lights - Since many coyote depredations occur at night, a sudden burst of light might scare them away. However, coyotes will adapt to a constant light. A constant light can be useful if the flock is being watched. Flashing lights of varying intensity and length or revolving lights will keep coyotes away for awhile. Lights can be positioned on tall poles, trees, fences or placed around the perimeter of the livestock. Frequently moving the lights will extend the effective period. Flares might be used on a temporary basis during problem outbreaks. In smaller areas perhaps photo cells could be used with lights. Anything breaking the light beam would trigger an alarm or other lights would turn on automatically thus frightening the coyote.

INDIRECT METHODS

MANAGEMENT

ENCOURAGE WILDLIFE FOR COYOTE FOOD BASE

If coyotes could get enough food from wildlife populations, there would be no need to prey on livestock. A coyote will prey on wildlife if it is available rather than risk an encounter with man.

Many unused portions of rangeland could become productive wildlife area. If some cover is provided in these areas wildlife will prosper. Fence rows, ditch banks, gullies, marshes and areas between fields have a potential. There are many state and federal programs that will provide some cost sharing for the purpose of increasing wildlife.

INCREASE FLEXIBILITY TO MOVE ANIMALS WHEN PREDATION OCCURS

Usually it takes several days to remove coyotes from a problem area. In the meantime, more livestock are being killed. Livestock should be moved to another area until the problem is cleared up. After the problem coyotes are removed the livestock can be returned. Several ranchers may want to make an agreement to help each other in case of serious predation. Also one rancher may have a safe area where the livestock can stay.

PROHIBIT LIVESTOCK IN CHRONIC PROBLEM AREAS

Some ranchers must realize that every year there will be heavy losses in certain areas. No matter what is done, losses will continue. Livestock should not be allowed in chronic problem area. Perhaps the rancher should change to other operations in that area.

MORE PROTECTION AT THE TIME OF LAMBING AND CALVING

Most coyote problems are at lambing and calving time. During this critical period more protection is necessary. More herders might be hired.

The animals can be moved to a safer location. If the livestock can be put in an area where a coyote can approach from only one direction (canyons, coyote proof fences on three sides, etc.), less supervision will be necessary.

MORE HERDSMAN

With more human supervision near the animals, a coyote attack is less likely to take place. If other activities can be incorporated into a herder's duties there might be more people desiring the job. A rotation of herders from different areas might help. Herders can switch off with ranch hands. Some kind of competition could be set up between sheep herders to promote better herding practices. If sheep herders received a percentage of the sheep at the end of the summer, instead of a salary, there might be better supervision. Sheep herders from other countries could be imported to decrease the labor costs.

HIRE A TRAPPER

Some livestock operations might find it cheaper to hire a trapper full or part time rather than allow losses to continue. For larger operations and chronic problem areas, a trapper would probably be economical. Experience has a large influence on the success of a control operation.

IMPROVE RANGE CONDITION

Good range will support more livestock per acre than poor range. Therefore, you can have more sheep in a smaller area on good range as compared to poor range. A smaller area is easier to control for predation. Overgrazed land supports little wildlife. Livestock are easier to catch and kill on overgrazed land.

BREED ANIMALS TO TAKE CARE OF THEMSELVES

A long range plan to decrease predation is to breed animals to be able to defend themselves. A start could involve letting sheep fend for themselves for five to ten years without human interference. If these survived, they could be bred. A "wilder" sheep would be necessary. Undoubtly it would take maybe 100 years to breed sheep who could run or fight to save himself. Maybe there are sheep already able to survive predators that man could use.

ECONOMICS

FEDERAL SUBSIDIZED SHEEP HERDERS

Predation has increased because flocks of sheep now have less supervision than in the past. This has come about because of the tendency toward fenced range as well as the cost and availability of labor. If more herders were used, predation would decrease. Federal subsidizes would allow sheep operators to use herders as a control method.

TAX INCENTIVES

When livestock losses are constantly high adjacent to federal or state owned land and it appears that the predators are coming from these lands, then there could be compensation made to the ranchers in the form of tax incentives on property. One Oregon county has a 20 percent reduction, in the assessment on agricultural land when it is located next to federal lands (Haskell 1973:123).

IMPROVE EFFICIENCY OF CONTROL PROGRAMS

A plan of evaluating the cost of each control method should be instituted. A cost versus benefit ratio then could be worked up for each method.

The cheapest control method that will do the job should be used.

Control programs should be administered more efficiently. Aerial flights could be organized so that the return trip will be useful also. Ground to air communication would increase the effectiveness of an aerial attack. Shared use of control equipment between agencies and individuals would lower equipment costs.

INCREASE VALUE OF COYOTE PELTS

If the demand for coyote fur increased, then more people would hunt coyotes for profit. This is free labor for the rancher. In April 1974 in Montana, the B.S.F.W. received \$31.66 for each coyote pelt. Fur prime-ness (November to March in Montana) and the condition (no holes, etc.) affects the prices of the pelt. Proper hunting and trapping techniques will improve pelt conditions. Pelt prices are largely dependent on the whims of the fashion market.

ESTABLISH A BOUNTY SYSTEM

The objective of the bounty system is to decrease predator populations. The idea of a bounty is to attach a price to a designated species pelt. This encourages the taking of more animals for monetary purposes. It is assumed that a decrease in predator numbers will result in less livestock damage.

The abundant information on the bounty system shows the ineffectiveness of this control method.

A. Abuse of bounty programs

1. Coyote pelts have been imported from one county to another for a higher price, pelts are transferred from counties without bounties, or receive payments of a second bounty (Evanson 1967:222).
2. Coyote pelts have been moved across state lines (Evanson 1967:222).

3. There have been cases where the ears and tail from one coyote have been paid double bounties, one for ears and one for tail (Evanson 1967:222).
 4. The passing off of gopher pelts as coyote pups (Evanson 1967:222).
 5. Unless there is a collection of the entire pelt and careful handling of the pelt, a dishonest trapper or agent may use the entire pelt or portions of it over again to get a bounty in the same county or another county (Evanson 1967:216).
 6. Traps and animals were often stolen from government control agents (Allen 1954).
- B. Usually the bounty hunters will go where the coyotes are most abundant or easiest to take, not necessarily where damage is occurring (Cain 1972:74).
 - C. Many of the bountied animals would have been killed any way. Coyotes have been killed as a result of other activities not designed only to take coyotes (Cain 1972:74).
 - D. Most state game departments recognize the drawbacks of the bounty system and oppose bounties (Cain 1972:74).
 - E. There have been many cases where there was no reduction in predator populations.
 - F. Some bounties may actually increase coyote populations. Bounty hunters may leave the coyotes undisturbed during the spring and summer so they can breed and raise pups. In the fall they will trap coyotes cutting off the tail and ears and releasing the coyote to breed again (Evanson 1967:221).

Carter County now has a \$15.00 bounty on coyotes. Is \$15.00 really incentive enough to motivate a person to hunt down coyotes? The B.S.F.W. received \$31.66 for coyote skins in April 1974 in Montana. The price of the pelt is incentive enough for it's pursuit. If there was no bounty, would ranchers stop shooting coyotes whenever they spotted one?

EDUCATION

Ranchers as well as control agents should be aware of the latest techniques of control. Armed with the knowledge of preventive techniques, ranchers can deter predation. If predation does occur, each rancher should know

how to get help or what control methods he can use. A periodic training program covering the previous points could be directed by federal control agents.

Sport hunting, a free means of control, should be promoted and encouraged. Techniques of a successful hunt should be available.

It is imperative that the public realize the magnitude of livestock losses. Eventually the cost of predator damage will be passed on to the consumer.

The coyote has it's place in the ecosystem. There are several examples of what happens when predators are removed. A public information program on both points is needed.

PREDATOR CONTROL LAWS

Following is a synopsis of legislative actions affecting various aspects of predator control.

1879-Territorial legislature authorized county commissioners to pay bounties on livestock-killing predators.

1915-Bureau of Biological Survey received \$125,000 from Congress for predator control activities.

1931-March 2, Predator Control Act - authorized Secretary of Agriculture to conduct research and control programs for the control of animals injurious to agriculture and livestock.

1931-Montana Department of Livestock entered a cooperative program with the Bureau of Biological Survey.

1939-Functions of the Secretary of Agriculture administered through the Bureau of Biological Survey was transferred to Secretary of the Interior.

1940-Bald Eagle Act - (federal) It is illegal to kill, take or possess a bald eagle.

1947-provisions Sec 46-1903 R.C.M. - The Department of Livestock was directed to formulate and conduct practical predatory animal control programs and to cooperate with other state and federal agencies.

1956-Fish and Wildlife Act - It is illegal to shoot at certain birds, fish and other animals from an aircraft.

1960-(federal law) - It is illegal to kill, take or possess a golden eagle.

1964-Federal Insecticide, Fungicide and Rodenticide Act - This act is administered by the Environmental Protection Agency. It provides that no pesticide can be sold or used unless it is registered by the EPA. EPA can register a pesticide if: 1) it will perform in a manner as claimed; 2) it will not have unreasonable adverse effects on the environment. However, if there is not adequate data to complete registration, an experimental use permit can be issued. Furthermore, if the Administrator of EPA determines that an emergency exists, federal or state agencies can be exempted from FIFRA's requirements (Melcher 1974:101-102).

1964-Leopold Report - Requested by Secretary of Interior; It stated: 1) Figures of predator losses on sheep were exaggerated. 2) Control should be limited to troublesome species, preferably to the depredating individuals or in any event to localities where damage and danger exist (McCoy 1974: 168). 3) The steel trap is the most damaging control method. 4) When properly used, 1080 is effective, humane, and with little effects on other wildlife (Wade 1973).

1971-Montana Environmental Policy Act - Establishment of an environmental quality council and requiring projects which significantly affect the quality of the environment to have prepared statement on unavoidable environmental effects, alternatives to the action, short and long term influences and any irreversible and irretrievable commitments of resources (Montana 1971:984-992). The Department of Livestock has prepared two such statements; Montana Rabid Skunk Control Emergency, and Montana Predator Animal Control Program.

1971-Montana Pesticide Act - Every pesticide distributed, or sold must be

registered with the Department of Agriculture and renewed annually. Dealers are required to be registered. The Department of Agriculture sets restrictions on use (Montana 1971:1437-1463).

1971-October-Cain Report-Predator Control 1971. The Cain Committee submitted 15 recommendations. Six of the more relevant recommendations follow (Cain 1972).

1. Immediate Congressional action be sought to remove all existing toxic chemicals from registration and use for operational predator control.
2. In all states a cooperative trapper-trainer extension program be established.
3. Congress provide some means of alleviating the economic burden on livestock producers who experience heavy losses by predators.
4. All methods of predator control be prohibited on statutory Wilderness Areas.
5. A long-term research program to cover the gamut of ecological problems associated with predators.
6. The Division of Wildlife Research of the Bureau of Sport Fisheries and Wildlife undertake a detailed socio-economic study of cost-benefit ratios of predator control.

1972-February 8 - Executive Order, Environmental Safeguards on Activities for Animal Damage Control on Federal Lands - Prevents the field use of any chemical toxicant on any federal lands or in any federal program for the purpose of killing a predatory mammal or bird or which causes any secondary poisoning. However, a chemical toxicant may be used if it is essential: 1) to protect human health and safety, 2) to preserve threatened wildlife or wildlife that are likely to become threatened,

3) to prevent irretrievable damages to nationally significant natural resources (includes livestock). The executive order removed two very effective predator control chemicals, sodium cyanide (M-44), and sodium monofluoroacetate (1080).

1972-March 9-Environmental Protection Agency Suspension of Registration for Certain Products Containing Sodium Fluoroacetate (1080), Strychnine and Sodium Cyanide - Interstate shipment of predator control devices using these chemicals was also prohibited. The Environmental Protection Agency was acting under the Federal Insecticide, Fungicide and Rodenticide Act. The Environmental Protection Agency based their recommendation on it's research, the Cain Report and letters from conservation groups. The EPA concluded that the poisons were an imminent hazard to the public and the chemicals were not applied in such a manner as to prevent injury to other vertebrate animals.

1973-Federal Animal Damage Abatement Act of 1973 - "(1) authorizes an expanded program of research, (2) provides for demonstration of control techniques, (3) authorizes financial assistance to states for carrying out control programs, (4) provides criminal penalties for field use on Federal lands of any chemical toxicant to kill predatory animals, or use of such chemical toxicant with secondary poisoning effects, and (5) repeals the Act of March 2, 1931" (Ruch 1973).

PRESENT CONTROL IN MONTANA

Total funding for fiscal year 1974 for the Predatory Animal Control

Program in Montana was \$451,421.00.

Department of Livestock	
includes trapper expenses and helicopter	\$ 58,700.00
rabies (legislature)	5,000.00
Total	\$ 63,700.00

Bureau of Sport Fisheries and Wildlife	
(changed to Fish and Wildlife Service	
July 1, 1974)	
From B.S.F.W.	\$165,600.00
Livestock mill levy from Department	
of Livestock	107,121.00
Department of Fish and Game	40,000.00
Counties (sheep license fee)	75,000.00
Total	\$387,721.00

The livestock mill levy assesses 4.5 mills on sheep and 2 mills on cattle and other livestock. The sheep license fee varies from \$.10 to \$.15/head according to the county.

Livestock Mill Levy Tax 18 Eastern Counties

Area	Sheep	Cattle & Others	Total
District #1	\$ 406.05	\$15584.41	\$15990.46
District #2	1577.87	18560.49	20038.36
District #3	9060.00	15306.00	24366.23
Total	\$11043.92	\$49451.13	\$60395.05

County Sheep License Fee 18 Eastern Counties

District 1	\$ 4,800
District 2	20,500
District 3	8,600
Total	\$33,950

Does not include Carter and Treasure Counties

The Montana field program beginning July 1, 1974 will be conducted by 17 full time trappers, 4 part-time trappers and 10 part-time aerial pilots. Ninety percent of Montana's control program expenditures were aimed at pro-

tecting the sheep industry. The total hours flown for predator control in the 18 counties of eastern Montana can be seen in Figure 6.

Department of Livestock

The Department of Livestock has agreements with the United States Department of Interior, United States Fish and Wildlife Service and the Montana Department of Fish and Game. The United States Bureau of Land Management, United States Forest Service, Montana Wool Growers Association, Montana Stockgrowers Association, County Commissioners and local livestock associations have direct input into Montana's predatory animal control program.

The Department of Livestock organizes the predatory animal program in Montana. In addition, the Department conducts research including the experimental M-44 program and provides a helicopter for predator control.

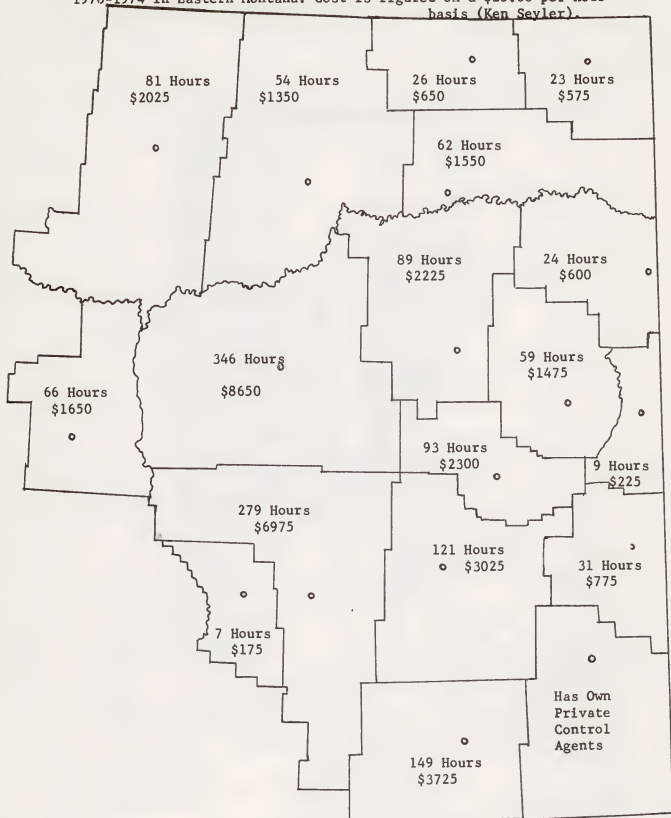
Fish and Wildlife Service

The Fish and Wildlife Service does most of the field control work in the state. Montana is divided into three districts. District 2 includes 16 1/2 counties in eastern Montana subdivided into 7 areas (Figure 7). There are 8 District Field Assistants and 1 District Supervisor (Figure 7).

If a rancher sustains continual losses he should contact the D.F.A. in his area. The D.F.A. will evaluate the situation and determine the best control method to use. The complaint calls are answered according to their seriousness. Every request for service is answered in one form or another, usually within three days.

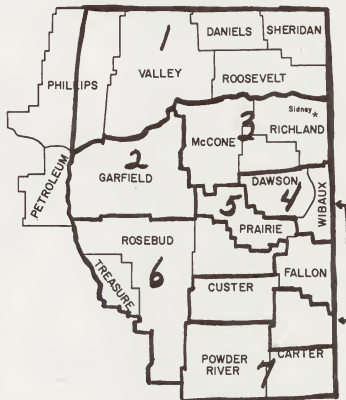
A damage control request form must be completed by the landowner prior to initiation of any ground work (Figure 8). When aerial operations are required it is left up to the landowner to obtain permission from his neighbors if control measures are to be carried out on adjoining lands. A special

Figure 6 Highest Number of Aerial Hunting Hours Flown in Any One Year During 1970-1974 in Eastern Montana. Cost is figured on a \$25.00 per hour basis (Ken Seyler).



ECONOMIC DEVELOPMENT ASSOCIATION
OF EASTERN MONTANA

Figure 7 District 2 of the Fish and Wildlife Service, Division of Control, in Montana and District Field Assistant Areas and Locations (source, Paul Bunke).



District Supervisor, District 2

Paul Bunke	Miles City	232-2536
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District Field Assistants

1. Wesley Scott	Glasgow	228-8577
2. Frank Morgan (6 months)	Jordan	435-4597
Earl White (6 months)	Sand Springs	
3. George Goos	Circle	485-3474
4. Russell Bice (6 months)	Terry	637-5488
Carter County has own service, keeps its own sheep license money, will service north half of Carter on request.		
5. James Barnes	Miles City	232-2864
6. Gene Griffith	Miles City	232-3722
Treasure County has no sheep license fee. Will service on request.		
7. Norman Turnbough	Broadus	436-2390

Henry Overcast	Chinook	357-2074
West half of Phillips County		

Figure 8 Control Request Form Filled Out by the Rancher Prior to Control Operations by Fish and Wildlife Service

DIVISION OF WILDLIFE SERVICES: State _____ County _____ Date _____

Name of Complainant _____

Address of Complainant _____

Phone No.	Location of Damage

Type of Damage Control Request:

() Damage	() Damage Prevention
() Nuisance	() Rabies Suppression

[illegible]

Damage (Unconfirmed): Number _____ Type _____ Approximate Value _____

Species Responsible for Depredation _____

Received by: (District Field Assistant) () Personal () Phone () Written
() Other

Details of Complaint (Dates of losses, results of work done, etc.): _____

form is required if the control request involves the Charles M. Russell National Wildlife Range.

In some cases mechanical control methods will not significantly reduce livestock losses. The Fish and Wildlife Service has a program permitting the emergency use of the M-44 in these cases. Prior to using the M-44, a "Request for the Emergency Use of the M-44 Device" must be completed by the landowner or if it is public land, the administering agency. The application is reviewed by the state supervisor and submitted to the regional director of the Fish and Wildlife Service for his approval. Some of the criteria the Director must consider in making his decision are as follows:

An emergency exists when:

- 1) Aerial or non-chemical control methods are not feasible or effective in protecting sheep.
- 2) Predator losses will be projected to be 8 percent or more during the growing season or
- 3) in low, open grassy pastures a confirmed 2 percent loss in 7 days, or mechanical methods unsuccessful for 14 days and predation on the average of .6 percent per week or mechanical methods unsuccessful for 28 days and predation on an average of .2 percent per week.
- 4) In heavy, bushy areas or rough steep terrain a confirmed 1 percent loss in 7 days, or mechanical methods unsuccessful for 14 days and predation an average of .3 percent per week or mechanical methods unsuccessful 28 days and predation on an average of .2 percent per week.

On private land the M-44 can be operational within a week of the complaint. Presently the Bureau of Land Management has not released guidelines on the emergency use of the M-44 on their land (Paul Bunke, personal communication).

From July 1973 to April 1974, in the 18 eastern counties, the Bureau flew 1098 hours (airplane and helicopter) at a cost of approximately \$24,500.00 (Table 6). During this period, 996 predators were taken for a cost of \$24.55 per predator. Appendix 11 shows state coyote predation information.

Table 6 Hours Flown, Cost and Predators Taken by the Fish and Wildlife Service, July 1973-April 1974, In the 18 Counties of Eastern Montana. Treasure and Carter have own control program (source Paul Bunke).

County	Hours Flown	Cost	Coyotes	Fox	Bobcats
Phillips	92.2	2,094.40	159	0	0
Valley	45.4	1,047.47	44	0	0
Daniels	12.0	282.00	5	0	0
Sheridan	40.9	780.40	12	0	0
Roosevelt	1.0	16.00	1	0	0
District 1	191.5	\$4,220.50	221	0	0
Petroleum	38.5	930.90	24	0	1
Garfield	278.8	6,899.90	132	19	0
McCone	64.7	1,820.80	31	4	1
Richland	40.1	686.60	21	3	0
Dawson	33.4	576.90	21	0	0
Prairie	62.0	1,197.50	47	8	0
Wibaux	6.6	151.80	1	1	0
District 2	525.1	\$12,263.50	277	35	2
Treasure	0.0	0.00	0	0	0
Rosebud	153.0	2,613.70	222	1	1
Custer	79.2	1,548.00	94	8	3
Powder River	126.5	3,270.30	100	5	1
Fallon	23.7	533.70	24	2	0
Carter	0.0	0.00	0	0	0
District 3	382.4	\$7,965.70	440	16	5
18 County Total	1098.0	\$24,449.70	938	51	7
State Total	2338.2	\$61,333.60	2379	71	7

The pelts from predators that are taken by the Fish and Wildlife Service are sold in the spring. Money received is submitted to the Department of Livestock for use in control work. For the 1973-74 season, pelts from throughout the state amounted to \$31,984.44

OTHER STATE PROGRAMS

Before alternate predator control programs are presented, a look at the present control programs of other states surrounding Montana might be beneficial.

NORTH DAKOTA

The Department of Agriculture is the agency responsible for administration of the Predator Control Program. The Department works closely with the Fish and Wildlife Service who provide personnel and decide when, where and how to control predators.

Funding: 1973-1975

Department of Agriculture	\$250,700
Fish and Wildlife Service	31,000
Total	<u>\$281,700</u>

Does not include salary of supervisor of Predator Control
(Henrick Voldal, Deputy Commissioner, Department of Agriculture,
personal communication).

SOUTH DAKOTA

The Department of Game, Fish and Parks assumed responsibility of the control program July 1, 1974. There are two separate programs in the state. Lands east of the Missouri River are handled by four extension trappers under the extension-cooperation concept. Fourteen trappers work the west part of the state similar to Montana's program. South Dakota has had a bounty system since 1945. Bounty payments have reduced from \$463,575.30 in 1946 to \$19,212.00 in 1973. At the same time, coyotes bountied have reduced from 42,405 coyotes in 1946 to 3,903 coyotes in 1973. At the present time, only coyotes are bountied.

The predator program is financed by the legislature and livestock producers. The surtax on livestock is four cents per sheep and one cent per head on cattle. (Fritz Faulkner, Animal Damage Control Supervisor, Department of Game, Fish, and Parks, personal communication).

WYOMING

The control program in Wyoming is supervised by the Fish and Wildlife Service in conjunction with the Wyoming Department of Agriculture. The program is run by the Fish and Wildlife Service. Local predatory animal control boards assist in funding and organization.

Funding: 1974

Wyoming Department of Agriculture	\$ 68,808
Wyoming Game and Fish Commission	50,000
Wyoming County Commissioners	46,000
Sales of Fur	66,000
Donations-approximately	<u>10,000</u>
Total	\$240,808

(Don Daiss, Agricultural Field Representative, Department of Agriculture, personal communication).

COLORADO

The Department of Agriculture assumed the predator control program in Colorado, November 1, 1973 taking over from the Bureau of Sport Fisheries and Wildlife. There are 24 full time mammal control agents and three part time agents. The Department has agreements with the Colorado Division of Wildlife, United States Forest Service and the Bureau of Land Management.

Fundings: 1973

4 mill tax levy on sheep and goats	\$106,000
local woolgrowers association, county commissioners, BLM advisory board funds	165,000
Division of Wildlife Commissioners	44,000
Division of Wildlife (bear & lion damage)	<u>22,000</u>
Total	\$337,000
Additional money for some aerial hunting from fur sales.	

(Gern B. Terrell, Chief, Rodent Control Section Department of Agriculture, personal communication).

IDAHO

The Fish and Wildlife Service cooperates with the Idaho Sheep Commission within the Department of Agriculture.

Funding: fiscal year 1974

Livestock Association	\$ 40,000
Sheep Assessment Money	106,000
Fish and Game Department	25,000
County and Canal Companies	<u>31,337</u>
Total Cooperative Funds	\$202,337
Federal Funds	<u>\$224,200</u>
State Total	\$426,537

There are 20 control agents in Idaho. (R.E. Simmons, Veterinarian in Charge, Idaho Sheep Commission, personal communication).



There are presently eleven possible predator control programs.

1. Fish and Wildlife Service
2. Montana Department of Livestock
3. Montana Department of Agirculture
4. Montana Department of Fish and Game
5. Cooperative Extension Service/Rancher
6. Economic Development Association of Eastern Montana
7. County
8. Private Company
9. Insurance Program
10. Nothing
11. Combination

Each program will be discussed spearately, explaining the program and the advantages and disadvantages of each.

1. Fish and Wildlife Service

This alternative program is currently being used in Montana. See Montana Predator Control Program. The advantage of a federal agency conducting the program is that they can often use techniques and chemicals not authorized for other agencies. Funding is also easier to acquire in some cases. A federal agency has the expertise of the many employees that support it with more resources available.

Local input is sometimes difficult to achieve. Many suggest that by the time the actual control operations are conducted most of the money has been used up in the red tape involved with a federal agency.

2. Montana Department of Livestock

Presently the Department of Livestock is cooperating with the Fish and

Wildlife Service in the Montana Predator Animal Control Program. However, the Department does not participate in very much of the field control work. If the Department assumed the total program it could probably hire the present District Field Assistants now employed by the Fish and Wildlife Service. A state program might be more receptive to local input. The Department of Livestock does have experience with predator damage and could assume the total responsibility. They would not be subject to some regulations the federal agency has to adhere to. By dropping the program with the Fish and Wildlife Service, some funding may be lost. The change over to a state program might lose effectiveness during the first few years. It would be necessary for the Department to purchase additional equipment and hire additional personnel.

3. Montana Department of Agriculture

The Montana Department of Agriculture could run a program similar to the Department of Livestock. North Dakota, Wyoming, Colorado and Idaho operate their program through the Department of Agriculture. The Montana Department has a Pesticide Control Division which could aid in predator control methods. They are familiar with problems of agriculture. District Field Assistants could be hired from the Fish and Wildlife Service. As a result of a state program some federal funding may be lost. The Department of Agriculture's major responsibility is to the farmer not to the livestock producer. As such, the livestock owner may not receive primary consideration.

4. Montana Department of Fish and Game

Many people and organizations have suggested that state departments of wildlife assume the responsibility of predator control. Wildlife departments are responsible for the wildlife in the state. They have many biologists with

the expertise to understand the behavior and activities of predators. The Department of Fish and Game could implement a control program which would have the least effects on the environment. They have game wardens and biologists and some training of the present personnel, the Department could respond to predator depredations.

The Montana Department of Fish and Game has been in contact with the Fish and Wildlife Service and the Montana Board of Livestock concerning a cooperative agreement on predator control (May 15, 1974). While there was no action, the Fish and Game is aware of the present control program in Montana and what they could do if the Department received the program (Fletcher Newby, personal communication).

The Department of Fish and Game is supported almost totally by sportsman license sales. Use of these funds could result in loss of matching federal funds. Funding would be required from other sources if the department were to develop a control program. The primary responsibility of the Fish and Game is the the wildlife of Montana. The Department might consider wildlife resources before livestock resources. The personnel of the Department might be more sympathetic to wildlife than the needs of ranchers. Some say this could result in an inadequate control program.

5. Cooperative Extension Service/Rancher

This predator control program would rely on the Cooperative Extension Agent in each county. Each agent must have some training in predator control methods. Perhaps the most successful state using this program is Kansas. The following information is taken from the program in Kansas.

The livestock owner who has damage reports to the county agent. After the agent has checked the damage, he recommends techniques the rancher can use to solve the predator problem. It is important that the rancher report

his losses immediately and that control be quickly provided. County agents would need to maintain a file on the hunters available and the type of hunting they specialize in (calling, trail hounds, trapping, shooting, etc.). The agent would then recommend a hunter with the best skills and tools for the particular animal and damage. Cards are issued to ardent hunters signed by the hunter and county agent.

If serious or persistent losses continue the county agent arranges a meeting between the rancher and an extension specialist. The specialist trains the livestock producer on control methods that will help solve his problem. Materials are also furnished as needed. The specialist also appraises the producers' management practices which relate to predator losses (grazing schedules, disposal of carrion, etc.). He then makes recommendations which will improve the situation. While the rancher is being trained, the specialist can handle the problem animals. In addition, the wildlife damage control specialist can be on call to remove "hard-to-get" predators (for a nominal fee).

Advantages

1. Using this program, the individual problem animal is usually removed.
2. When a problem arises, the predator can be stopped immediately by the rancher.
3. As time passes each rancher will become more proficient in dealing with predators.
4. Preventing damage is accomplished by better management.
5. Each year the informed rancher will probably train other ranchers.
6. The fee charged by the extension specialist for direct service will encourage land owners to do their own control work.
7. This type of program is inexpensive. In 1973, Kansas spent less for Predator control than 16 other western states (Hendersen 1973).

Disadvantages

1. This method works well in areas where ranches are small and there are more people to conduct control operations. This is not the case in Montana. It is very difficult for the owner to cover all the area.
2. The ranchers don't have the time to develop the expertise of predator control.
3. It would be difficult for county agents to check on damage complaints with the vast acreage involved.
4. The only very effective methods in eastern Montana are poisons and aircraft hunting. Poisons are illegal to use and aircraft hunting would be too expensive for each rancher.
5. A conflict might arise when ranchers try to use some control methods on federal land.

6. Economic Development Association of Eastern Montana

EDAEM would be responsible for the predator control program in the eastern 18 counties. Since EDAEM is a "grass roots" organization, local input from the rancher would be possible. The "true" situation could be assessed and dealt with. By using an 18 county organization, the equipment and personnel could be shared to reduce costs. Control personnel could be used in any part of the area when a trouble call is received. An education program accompanying the control operation would be more effective than a state education program. The cost of maintaining the different government administrative levels would be circumvented.

EDAEM would need a source of funding for such a project. Funding a sparsely populated 18 county area would be an obstacle. At the present time EDAEM has no personnel, equipment or money for predator control. EDAEM's experience in this area is a three month study on predator losses, control methods and control programs. There would certainly be some temporary loss in effectiveness.

7. County

A county predator control program would certainly be the best for gaining assistance in a problem area. If a control agent only had to cover one county he could do a much more thorough job. Every request for service could receive the full attention of the agent. A local control program would eliminate administrative costs. Request for assistance could be answered immediately. If adequate monies were appropriated, the county program would definitely be the best predator control program. Federal money might be difficult to obtain on a county basis, since there would be no employees of the government in the operation. By limiting the program to a county, cost efficiency might drop. Many counties do not have a serious enough problem to warrant their own control program.

8. Private Company

Many people say that government run programs are the best way to waste money. The government is not competing for business so it might be less efficient in its operations. Political weight would not be a factor in responding to requests. If several predator control companies were set up, the competition might decrease the cost of predator control. Unrestricted by regulations, they could respond to damage complaints promptly. More innovative and imaginative thinking might produce new and better techniques to decrease livestock losses.

One private company could hold a monopoly on control and increase prices. The probability of attracting more than one company is very low. Services would be rendered on a monetary basis rather than seriousness to the operator. Any private program would be too expensive to the rancher. Private firms work on a profit basis where as government programs do not. If ranchers had to use private companies, the price of sheep and cattle on the market would

be astronomical.

9. Insurance Program

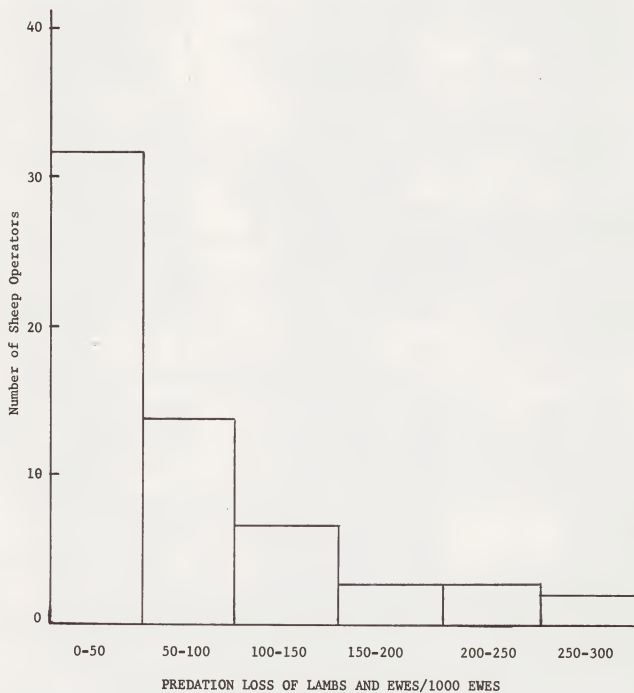
An insurance program would reduce some of the economic loss suffered by livestock producers. This would allow the sheep industry to stay in business. The insurance would only cover sheep growers since they are experiencing most of the damage.

There are three big problems in setting up an insurance program; 1) confirmation of losses is very difficult; 2) if the program was voluntary only producers with heavy losses would take out insurance and; 3) even if all producers were required to have predator insurance, the way in which the losses are distributed statistically among the sheep-rearing operations makes it uneconomical for an insurance company (Figure 9). There are some solutions to these obstacles.

The insurance program would be funded by sheep growers and supplemented by state and/or federal monies. All private and federal land would be included. Every sheepman would be required to take out insurance. The present mill levy tax on livestock for predator control would be dropped. The Fish and Wildlife Service predator control program would also be discontinued. Since documented predator kills would be impossible for every rancher (kills must be examined within 3 days) the insurance would include all losses (birth defects, disease, accident, predator losses, etc.). To get the total loss a count is made of total sheep and lambs born in the spring. Before the next springtime lambing, another count is made. The second figure is subtracted from the first. Losses do not include sales of sheep. For example;

	April 1974	After Lambing May 1974	September 1974	After Sale September	April 1975
Total Sheep	1,000	2,000	1,820	1,020	1,000

Figure 9 Frequency Distribution of Sheep Losses (Cain 1972:48)



A record must be kept on the number of lambs and sheep lost. Total losses would be 200 sheep or 10 percent of the flock.

Premium payments for each rancher would be based on the following guidelines.

1. Past history of predator losses

The average total loss per year would be figured or estimated for at least the last five years. Any losses above this figure would be reimbursed by the insurance company at a rate of 50% of the assessed value. The assessed value is the value of the sheep or lambs at the fall sheep sales. The price of the wool from each sheep the previous spring is also included. Any losses above nine percent per year will be paid to the rancher.

2. Predator control

Any predator control by the rancher will result in a discount on the premium payment. The type of control methods and the money expended will determine the discount.

3. Management

Any ranchers who have a good management system that prevents predation will receive a discount. Good management includes more herders, using repellents, moving sheep when predation occurs, etc.

4. Penalty assessments

Any person who willfully submits false information will be assessed a penalty fee corresponding to an amount greater than the benefits he received. In addition there will be periodic inspections of sheep operations by an agent of the insurance company.

Much of the previous information regarding insurance was obtained from the Cain report.

An insurance program that was just outlined could be tried for several years. If the total cost greatly exceeded the present predator control program, the insurance should be discontinued. There will probably be a dramatic increase in predation the first several years. Many people estimate the total loss would increase to 35 percent per year. The insurance program, if adequately funded, would cover 50 percent of the losses above the nine percent. The effect of reduced sheep meat and wool may have an adverse affect on the economy. With increased predation, some ranchers could not maintain a stable flock size or would be forced out of business because the 50 percent reimbursement would not be enough. Another problem arises as to what would happen to other livestock producers (e.g. cattle, goats, etc.) when predator populations increase. There is no means of reimbursing them for damage or reducing predator numbers by such an insurance program. The question is whether these ranchers would sustain significant losses if predators were allowed to take sheep.

10. Nothing

There are two advantages to a "nothing" program; 1) there would be no money spent on predator control, allowing the money to be spent elsewhere; 2) the environment would return to a condition of the wildlife maintaining balance.

I think the rancher left on his own with no education or predator control help could not deal with predator damage. If the present control program is not working a rancher certainly can't do better on his own.

A "nothing" control program would result in one of three conditions, 1) the rancher could go out of business and establish a new means of making a living which would not be affected by predators; 2) the rancher could stay

in business, absorb losses, and pass the cost of the losses onto the consumer or; 3) the rancher could prosper by switching his business to raising coyotes.

11. Combination

If a combination program were initiated it could include the advantages of several different control programs. A program of this type would require the cooperation of various federal, state, local and private groups. Combination programs would make more efficient use of resources. Most of the existing programs in other states involve a cooperative effort between various groups.

A program presently being considered involves the Department of Livestock and individual counties. The county would pay all salaries and expenditures incurred by the Department of Livestock. The Department of Livestock would reimburse the counties up to a certain amount from the livestock mill levy tax and Fish and Game monies. Additional sources of funding include local county governments, local livestock organizations, county revenue sharing monies, the state legislature and others. The Department would train and supervise the trappers employed by the county and supervise aerial hunting. Each county would have a Predator Animal Control Board representing the funding sources to plan the program each year (Cheney 1974:26).

Actually any one of the previous control program alternatives would work if it received adequate funding. However, funding is always limited so the most efficient program should be used. Because of inadequate funding and predicide restrictions, the control program in Montana is not satisfactory. There are two choices; modify the present program or establish a new control program. If a new program were established, which agency should be assigned to carry it out? I have asked several extension agents within the 18 counties

for their comments. Seven agents favored the Department of Livestock, three favored the Department of Agriculture and two agents indicated the Cooperative Extension Service/Rancher might work.

CONSLUSIONS

1. There is a lack of communication between the rancher and the urban public.
2. The coyote is undoubtedly the prime predator causing livestock losses.
3. The red fox causes more damage than most people realize (21.1% EDAEM survey) but usually takes only lambs and smaller prey.
4. The present Montana predator control program is not reducing predation enough to allow many of the sheep growers to stay in business.
5. At the present time no single predator control method will work in all situations.
6. Coyotes are very adaptable so control techniques must be changed periodically.
7. Chemical toxicants are the most effective control methods for reducing coyote populations.
8. Many ranchers are aware of alternate control methods but don't have the time, money or motivation to try them.
9. Preventive control techniques are the most promising control tools in stopping predation on livestock.
10. There is a need for more cooperation between agencies involved in predator control.
11. The county predator control program is the best alternative if implemented.
12. The U.S. Fish and Wildlife Service or the Department of Livestock or the County program or a combination of predator control programs might work in eastern Montana.
13. To be effective in reducing predation in Montana, at least three organizations must be involved, U.S. Fish and Wildlife Service, Montana Department of Livestock and Montana Wool Grower's Association.



RECOMMENDATIONS

General

1. The urban public must get involved in predator control projects if control methods are to be acceptable to all.
2. Initiate additional educational programs aimed at both viewpoints.
3. Ranchers should use the present control program to its fullest.
4. The Montana or National wool growers should employ a biologist with an agriculture background to provide assistance to ranchers in management and control methods. Other organizations might help, such as the Montana Stockgrowers, etc.
5. The wool growers association should determine needed research on various control techniques and sponsor research projects.
6. Additional research should be conducted especially on management procedures to prevent livestock losses.
7. The cattlemen should be surveyed to determine their losses to predation.
8. A method should be established to document annual livestock predator losses. Mail surveys, telephone interviews and personal interviews could be used. The Department of Livestock, the Montana Wool Growers Association, EDAEM, other groups or even an environmental organization could gather the information.
9. A training program for the ranchers could be set up on predator control techniques, new research, etc. The Department of Livestock and Fish and Wildlife Service might assist.
10. The use of 1080 should be reinstated as a control tool immediately unless an acceptable alternative is found.

EDAEM

1. Employ a man to keep abreast of new research, conduct research, give advice to ranchers, conduct surveys, encourage cooperation between agencies, ranchers, and environmental groups, conduct training workshops, and education programs aimed at the rancher and urban public.
2. At each quarterly meeting, a report should be given on the predator situation by the Fish and Wildlife Service or an employee of EDAEM.
3. EDAEM, in cooperation with the Montana Fish and Game, should encourage sport hunting of predators and may sponsor a predator calling contest in the winter.
4. EDAEM should distribute literature on sport hunting and other aspects of

of predator control.

5. EDAEM could sponsor some training workshops on control methods and management aimed at reducing livestock depredations.
6. EDAEM should distribute study conducted by author to all interested persons and groups.

R O D E N T S

Rodents are small to medium sized herbivorous mammals with teeth modified for gnawing and grinding, incisors that grow continually from birth and has no canines (Lechleitner 1969:77).

Problem rodents in the 18 counties of eastern Montana include the northern pocket gopher, black-tailed prairie dog, Richardson ground squirrel (flicker tail), thirteen-lined ground squirrel, Wyoming pocket mouse, western harvest mouse, Norway rat, house mouse and muskrat. There are no moles in Montana.

Rodents cause a considerable economic loss to the rancher. They take valuable land out of production by feeding or burrowing. Livestock can not graze on barren soil and crops can not withstand rodent appetites. Rodents also damage equipment, buildings, dikes, wires and cables. A broken sickle guard caused by a prairie dog hole not only costs money to replace but delays the harvest.

The amount of rodent damage in eastern Montana can be obtained from the results of several surveys.

The Department of Livestock circulated a rodenticide questionnaire during the fall of 1973. This was sent to the Committee for Rural Development (CRD) in each county. It contained questions on the use of rodenticides and the amount of damage being caused by rodents in each county.

The rodent causing the most damage was the Richardson ground squirrel followed by the prairie dog, pocket gopher, mice and Norway rat (Table 1). The dollar damage figure for the 18 counties was \$2,196,100 compared to \$10,007,948 for the 50 counties completing the survey. The total damage shown for the 18 county area is low since estimates were not made by six of the counties.

Table 1 Dollar Rodent Damage in Eastern Montana from the Department of Livestock Rodenticide Questionnaire Fall 1973 (source Ken Seyler)

County	Richardson Ground Squirrel	Prairie Dog	Pocket Gopher	Norway Rat	Mice	Others	Total
Phillips	NO ESTIMATE OF DAMAGE MADE						
Valley	1,313,500	--	--	--	88,000	--	1,401,500
Daniels	109,400	--	--	50,000	70,000	10,500	239,000
Sheridan	34,700	--	--	5,000	7,000	--	46,700
Roosevelt	80,000	--	20,000	--	--	--	100,000
District 1	\$1,537,600	--	\$20,000	\$55,000	\$165,000	\$10,500	\$1,788,100
Petroleum	--	5,000	--	--	--	--	5,000
Garfield	NO DATA AVAILABLE						
McCone	NO ESTIMATE OF DAMAGE MADE						
Richland	56,000	--	--	--	--	--	56,000
Dawson	NO DATA AVAILABLE						
Prairie	NO DATA AVAILABLE						
Wibaux	NO ESTIMATE OF DAMAGE MADE						
District 2	\$56,000	\$5,000	--	--	--	--	\$61,000
Treasure & Rosebud	--	15,000	7,000	--	--	--	22,000
Custer	--	78,000	98,000	--	11,000	--	187,000
Powder River	--	90,000	--	--	--	--	90,000
Fallon & Carter	--	3,000	--	--	25,000	20,000	48,000
District 3	--	\$186,000	\$105,000	--	\$36,000	\$20,000	\$347,000
18 County Total	\$1,593,600	\$191,000	\$125,000	\$55,000	\$92,000	\$30,500	\$2,196,100
State Total	\$4,708,710	\$718,400	\$2,392,500	\$66,000	\$543,028	\$360,810	\$10,007,948*

*State total includes \$1,218,500 from the Columbian ground squirrel not found in eastern Montana

Several of the questions on the survey related to rodenticide safety.

1. Do the considerations of human health and/or economics require continued control of certain rodent species by rodenticides in your county?
2. Does the present use of rodenticides cause any substantial danger through secondary poisoning to non-target species?
3. Does the present use of rodenticides in your county pose an environmental threat of extinction to non-target species?
4. Are you aware of any alternative methods for the control of rodents in your county other than rodenticides?
5. Do you believe the use of rodenticides in general can be sufficiently restricted and controlled to render them environmentally safe to a high degree, but still effective on target species?

Question	18 Eastern Counties*		50 Counties	
	Yes	No	Yes	No
1	14	--	50	--
2	--	14	3	47
3	--	14	--	50
4	11	3	19	31
5	4	10	43	7

*The results from Garfield, Dawson, Prairie and Treasure Counties were not available.

The Economic Development Association of Eastern Montana conducted a predator and rodent survey in the 18 county area during July and August 1974 directed at sheep producers (Appendix 4,5). Six hundred and twelve survey forms were distributed. Names of wool growers were obtained from various sources; wool pools, assessor lists, Department of Livestock, Extension Service. In addition, survey forms were distributed at three range tours held in the area. Because of the large numbers, only half of the names were surveyed in Carter, Powder River and Garfield counties. The rodent damage assessment covered the period from January 1 to July 1, 1974. Of the 612 surveys, 128 were returned with 108 providing information for rodent damage analysis. This was a return of 17.6 percent.

The rodent damage most frequently reported was loss of production on pasture and hayland. This was due to destruction of vegetation and the building of burrows and tunnels. Other reported damage included equipment, dikes, ditch banks (loss of irrigation water), field grain, haystacks, stored grain and livestock pellets.

Eighty-eight percent of the rodent questionnaires returned indicated some rodent damage. Sixty percent of the surveys which indicated damage cited dollar losses (Table 2, Figure 1). Ranked according to dollar damage, the prairie dog was the highest followed by the Richardson ground squirrel, pocket gopher and last, rats and mice. The 18 county total rodent damage according to the survey was \$55,205. The reported damage per farm varied from \$150.00 to \$2,435.00. Sixty-four percent of the 95 ranchers that indicated rodent damage had no rodent control program. Since the survey form was only sent to wool growers, the dollar damage is probably below the actual loss.

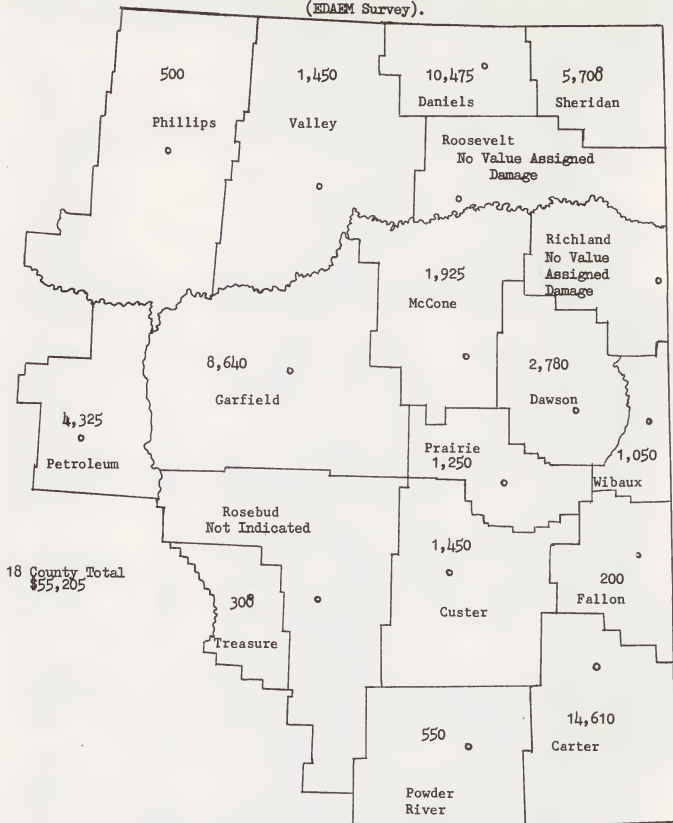
The Montana Department of Health and Environmental Sciences conducted a survey on the Norway rat during April and May 1974. The questionnaires were sent to county sanitarians and extension agents. Returns were not available from Valley, Petroleum, Treasure, Rosebud, and Custer Counties.

The Norway rat seems to be a problem in the eastern third of the 18 eastern counties (Figure 2). Garfield and Prairie Counties are the only eastern counties not reporting the Norway rat. Only two counties, Richland and Wibaux, had received requests for rat control. Surveys showed the Norway rat was found in nearly all city dumps. Several completed questionnaires indicated a desire for the Fish and Wildlife Service to conduct a control program (Ken Quickenden, personal communication).

Table 2 Economic Loss Caused by Rodents in the 18 Eastern Counties of Montana (EDAEM survey distributed to wool growers covering the period January 1-July 1, 1974)

County	Richardson Ground Squirrel	Prairie Dog	Pocket Gopher	Rats & Mice	Total	Average Dollar Damage per Rancher
Phillips	500	--	--	--	500	250.00
Valley	700	--	250	500	1,450	483.33
Daniels	10,375	--	--	100	10,475	1,496.43
Sheridan	4,300	150	1,250	--	5,700	950.00
Roosevelt	NO VALUE ASSIGNED DAMAGE					
District 1	\$15,875	\$150	\$1,500	\$600	\$18,125	
Petroleum	500	3,130	--	695	4,325	1,441.67
Garfield	--	7,190	100	1,350	8,640	1,234.29
McCone	--	50	1,275	600	1,925	275.00
Richland	NO VALUE ASSIGNED DAMAGE					
Dawson	--	--	1,100	1,680	2,780	556.00
Prairie	--	100	1,000	150	1,250	625.00
Wibaux	--	--	1,050	--	1,050	350.00
District 2	\$500	\$10,470	\$4,525	\$4,475	\$19,970	
Treasure	--	50	200	50	300	150.00
Rosebud	NO DAMAGE INDICATED					
Custer	--	--	1,050	400	1,450	483.33
Powder River	--	150	--	400	550	275.00
Fallon	--	--	150	50	200	200.00
Carter	200	12,150	2,000	260	14,610	2,435.00
District 3	\$200	\$12,350	\$3,400	\$1,160	\$17,110	
18 County Total	\$16,575	\$22,970	\$9,425	\$6,235	\$55,205	

Figure 1 Economic Loss Caused by Rodents in the 18 Eastern Counties of Montana
(EDAEM Survey).



ECONOMIC DEVELOPMENT ASSOCIATION
OF EASTERN MONTANA

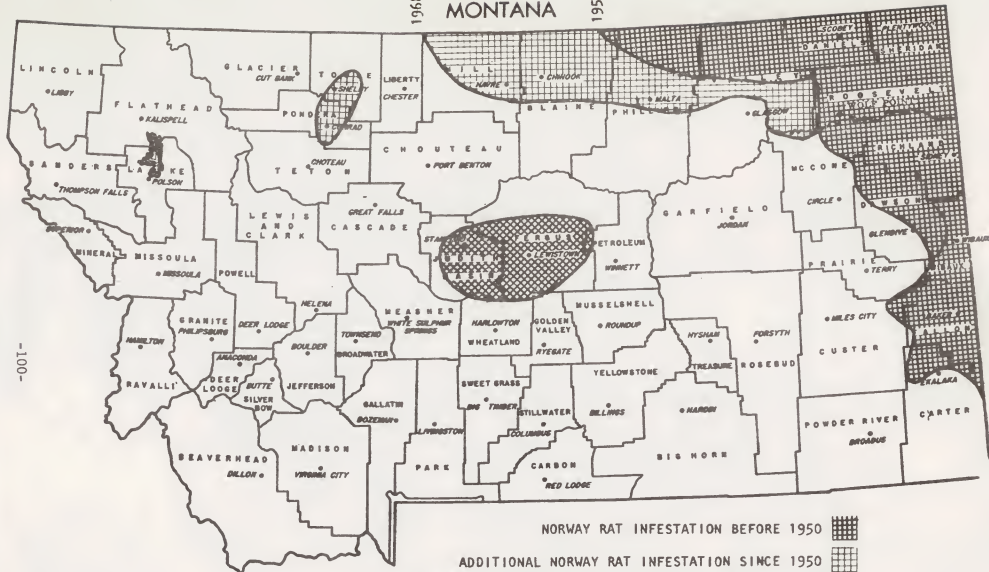
Figure 2

NORWAY RAT INFESTATION

1968

MONTANA

1950



NORWAY RAT INFESTATION BEFORE 1950



ADDITIONAL NORWAY RAT INFESTATION SINCE 1950



MONTANA DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES

Environmental Sciences Division

Environmental Services Bureau

Helena, Montana



RODENT CONTROL

Habitat manipulation is generally not possible with rodents because their habitats are croplands and rangeland. Generally though, good rangeland will support few rodents.

Rodenticides are very effective in rodent control. Strychnine, an effective poison, can only be obtained in pre-formulated baits from an authorized dealer. Contact your county Extension agent for information on use of poisons and the name of your local county distributor. If your county poison distributor does not have the strength of bait you need, he can order it. County poison distributors can order 1-10 (0.50%) strychnine oats from the Fish and Wildlife Service in Billings. Strychnine oat baits generally sell from \$3.00 to \$4.00 per 10 pounds. Before supplying the bait the dealer must make the purchaser aware of certain precautions in handling strychnine (Table 3). Baits can be placed with burrow builders or by hand. Presently only Valley, Richland, Prairie, McCone, Wibaux and Fallon counties have access to a burrow builder. Sometimes poison baits are initially rejected because of their strange taste. Bait shyness can be remedied by introducing the untreated carrier several days before the poison is added. To prolong low population levels brought about by a poison, a second treatment using a different poison and bait should be used (Palm 1970:92).

Encouraging native predators that do not harm livestock will help reduce rodent populations, but do not expect the predators to do the whole job. Cats around the farmhouse will kill some mice.

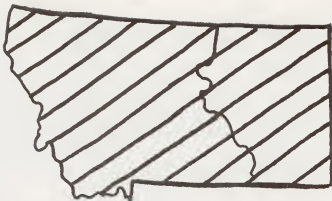
Shooting kills some rodents but does not significantly reduce the population. Rodents are often too well concealed and much of their activity is at night.

Table 3 Safe Handling of Poison Baits (BSFW 1974)

1. Observe label directions, never use more than recommended amount.
 2. Gloves should be worn when handling bait material.
 3. Bait dippers or spoons should be used for safety and as a measuring device.
 4. When handling bait, wash before eating or smoking.
 5. Examine cuffs and pockets to prevent carrying bait home.
 6. Sweep out trucks in the field, not at headquarters or home.
 7. Bait should be kept in original labeled containers.
 8. Keep bait sacks closed when not in use or when crossing fences, deep gullies, etc.
 9. Empty bait sacks must be completely burned.
 10. Remove bait sacks from horses when dismounted.
 11. In the field bait must be kept in closed boxes or inside vehicles to protect livestock.
 12. Containers, dippers, gloves, and bait must be stored under lock in buildings inaccessible to children and unsuspecting persons.
 13. Equipment and gloves should be washed thoroughly and held exclusively for use with poison bait.
 14. Pets, especially dogs, should be kept out of baited areas for at least ten days following the bait application.
 15. Order only enough bait to do your immediate job. Fresh bait is more acceptable than old bait. The hazard of storing bait over long periods is eliminated.
 16. Do not store bait near food, feed, or drinking liquids.
 17. Do not permit any person to remove bait from a project for personal use or give bait to any unauthorized person under any circumstances.
 18. Remember--the possibility that liability claims may be brought against you in the event of accidental or negligent poisoning.
-

NORTHERN POCKET GOPHER
Thomomys talpoides

RANGE: Pocket gophers are found in varying degrees of infestation over all of the state. They adapt themselves to modern agricultural conditions and, except in irrigated



areas, multiply more rapidly than under native condition. They are numerous in alfalfa fields and meadows, but do not confine themselves to any particular type of soil or food. They can be found in heavy clay loams of the valley bottoms or in the loose gravel type on the mountain tops.

DESCRIPTION: The pocket gopher in Montana is fairly small. It is considerably larger than the largest field mouse but only about 1/3 the size of a Richardson ground squirrel. It seldom exceeds 8 inches in length. It has a broad head with strong curving incisors, and its neck and legs are short, making it a very compactly built little animal. The tail is about 1/3 of its total body length and rather sparsely haired. One of its most easily distinguished characteristics is the fur-lined cheek pouch on each side of its face.

It is equipped with powerful claws on the forefeet and with much smaller and weaker ones on the hind feet. Its fine, soft hair varies in color from dark brown to a slate gray. Blackish patches are usually found about the head with touches of white about the lips, lining of cheek pouches, and feet. The tail is light in color and blends into the underside color. Short dark base hairs are found along the under side. (BSFW 1974).

BIOLOGY: The young are born from late winter to early spring. The number of young in a litter varies from four to seven, with one or two litters per year (BSFW 1974).

HABITS: It is definitely known that pocket gophers, except during the breeding season and during the nesting of young, usually live alone in one burrow system. Where the infestation is heavy, separate systems are apt to cross and more than one individual can be caught at one trap set.

They dig extensive underground tunnel systems. The dirt from these tunnels is pushed to the surface to form the mounds which characterize the gopher infested area. These mounds are at the ends of short lateral tunnels which branch off the main runway. The surface opening through which the dirt is pushed is finally plugged with dirt leaving a small horseshoe-like depression on one side of the mound. The surface openings are kept plugged except when the occupant is actually working or feeding on the surface.

Gophers feed almost entirely upon vegetable matter. They are active throughout the year, and consequently store up food for the winter months when the ground is frozen. A great variety of roots, bulbs, tubers, and grasses, including the roots of alfalfa, clover, grains, and fruit trees have been found in their stores of food. They are fond of root crops, such as potatoes, and carrots, and can completely destroy a garden.

Because of its subterranean nature and the limited amount of surface sign, the damage caused by this animal is often unnoticed or is attributed to some other cause. Very often an entire seedling is pulled down into the burrow and eaten. Root cutting is usually not noticed in an orchard until crowns turn brown during the summer. Occasionally trees will tip at odd angles and may be pulled up easily, roots entirely eaten off. During the winter season, they do considerable feeding on the surface under snow cover. At this time, they will gnaw the bark from trees up to an inch or more in diameter. The damage may extend from the roots to a foot or more above the ground. This above ground stem barking may be distinguished from meadow mice

barking by its plainly visible tooth marks instead of the finely gnawed appearance of the mouse damage. It may be distinguished from porcupine barking by the size of the incisor grooves. Supplemental field signs such as mounds and earth casts from winter snow tunnels are good indicators of pocket gopher activity (BSFW 1974).

CONTROL: The pocket gopher is the only true gopher in the state. Practically all the squirrels are misnamed "gopher" thus making it difficult for specialists to recommend control measures. There are no moles in Montana.

Three methods of control are suitable, depending on the nature of the gopher problem. Small to medium sized areas such as gardens, small fields, and orchards can be controlled by trapping with Macabee or Victor gopher traps, or hand poisoning. Large areas such as irrigation ditch banks, alfalfa fields, and golf courses are best controlled with a tractor drawn mechanical burrow builder 1-10(0.50%) strychnine oats is recommended (BSFW 1974).

Burrow builders (example, Elston gopher getter) use 1-10(0.50%) strychnine oats with rhoplex. The burrow builder places poisoned bait in artificially constructed runways. Cutting these burrows at 20 to 25 feet intervals and at the depth of the existing gopher runways, the artificial runways will intercept the natural ones. Treatment is recommended in the spring and fall with some success after the first cutting of alfalfa. The soil moisture should be high enough to hold the formed tunnels. If the soil sticks to the backpacker wheels, it is too wet. Burrow builders kill from 80 to 100 percent of the pocket gophers in the treated area. Some soils are not suitable for the burrow builder. The effectiveness of burrow builders are dependent upon soil types and conditions (Elston 1974).

Pocket gopher control is readily effected by placing baits in the main

runways. An opening is made with a blunt probe. Probes may be made of a bluntly pointed broom or shovel handle. Locate the main runway by probing into the soil 12 to 18 inches back from the mound. When the probe drops into the runway the release of ground friction will be felt. Remove the probe and insert the bait material: vegetable bait 2 or 3 pieces; grain bait, 1 level tablespoonful. Close the opening with grass and cover with dirt to keep out all light and air. Determine the over-all extent of the runway and place a bait near each end, and one or more baits in the central part of the system. In predominantly sandy soil, or whenever the runway is difficult to locate, the use of a probe is impractical. Under such conditions open the runway through the mound; insert bait into the main runway with a long-handled spoon; and close the surface opening with grass and cover with dirt (Fish and Wildlife Service 1952).

Gophacide, also known as Bayer 38819 and DRC-714, has been successfully tested at the Denver Wildlife Research Center. Grain baits containing .1 to .2 percent Gophacide properly distributed with a burrow builder or hand dispensed gave good gopher control, greater than 90 percent kill (Ward et. al. 1967).

Trapping involves procedures similiar to baiting methods. Two traps should be placed in the main runway. Place two or more "trap sets" at intervals along the main runway system (Fish and Wildlife Service 1952).

BLACK-TAILED PRAIRIE DOG
Cynomys ludovicianus

RANGE: The prairie dog in Montana confines itself to the eastern, or great plains portion of the state. It is found in all 18 counties. Prairie County has the highest population density.



(Burt 1964:102)

0.5 % STRYCHNINE TREATED GRAIN

DANGER



POISON

**ACTIVE INGREDIENT:
STRYCHNINE ALKALOID**

0.5 %

INERT INGREDIENTS

**99.5 %
TOTAL 100.00%**

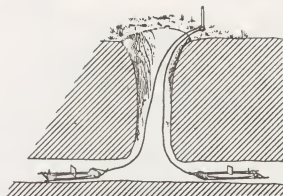
DANGER: KEEP OUT OF REACH OF CHILDREN.

**DANGER: CONVULSIVE POISON. KEEP AWAY FROM CHILDREN
AND DOMESTIC ANIMALS. DO NOT CONTAMINATE FEED AND
FOODSTUFFS.**

ANTIDOTE: CALL A PHYSICIAN IMMEDIATELY!!

IF LESS THAN TEN MINUTES HAVE PASSED SINCE THE POISON WAS TAKEN,
GIVE A TEASPOONFUL OF OILY IN A GLASS OF WARM WATER TO INDUCE
VOMITING. FOR THE SEVERE, TREATMENT BY THIS METHOD AFTER TEN
MINUTES MAY BRING ABOUT A COMPLICATION. HAVE VICTIM Lie DOWN IN
A DARK, QUIET ROOM AND KEEP HIM WARM UNTIL THE PHYSICIAN ARRIVES.
WHERE PLACEMENT OF STRYCHNINE TREATED GRAIN PRESERVES
IS HAZARDOUS TO WILDLIFE, PETS OR LIVESTOCK. ALL PLACEMENTS
SHOULD BE MADE IN OR UNDER COVER. GRAIN BATS EXPOSED
ON GROUND MAY BE HAZARDOUS TO BIRDS.

KEEP OUT OF REACH OF CHILDREN.



Trap Set

.5% strychnine oats recommended for
pocket gopher control (Photo Brian Hanson)



Elston Burrow Builder for pocket gopher control
(Photo Brian Hanson)

DESCRIPTION: There are two species of prairie dogs in the state, the black-tailed, Cynomys ludovicianus, and white-tailed Cynomys leucurus; but the latter range covers just a small portion of southern Carbon County and this form does not constitute a separate problem.

The black-tailed prairie dog is a robust, heavy-bodied squirrel with a comparatively short tail that invariably jerks forward and backward as he barks. The upper coat is a pinkish cinnamon color, with touches of black and tan. The under parts are white to creamy white. The tail is short, heavy, and black-tipped for about 1/3 of its length. In winter, its pelage becomes longer and softer and has a few dark markings (BSFW 1974).

BIOLOGY: The young are usually born in early April in underground nests, and appear above ground during the first part of May. Occassionally, very small ones are seen during the middle of the summer.

The number of young in a litter varies from four to nine with one litter a year. In short time the young animals begin eating grass, roots, etc., and sit up and chirp or bark as do the adults (BSFW 1974).

HABITS: Prairie dogs are very gregarious by nature and for the most part are found on colonies, or "towns", that vary from just a few individuals to thousands. As a rule the colonies are started in places that provide the most succulent grasses and spread from such centers.

In Montana these rodents might be called semi-hibernating. They are active during fair weather throughout the year but may remain in their burrows for several months during severe cold weather. They do not store up food for winter, as is commonly supposed, but when confined to their dens, live on their body fat.

During hibernation they curl up and go into a stupor that lasts until

fair weather or excessive hunger awakens them and sends them to the surface. Experiments indicate that they eat very little during the winter, even when food is available.

By the middle of the summer the young are beginning to make new burrow diggings of their own or have appropriated the homes of their parents. Not only do these rodents eat considerable quantities of valuable forage, but they cut down a great deal more in order that they may have a good protective view from their mounds. After prairie dogs have consumed all the vegetation near their mounds, they will establish a new burrow near the periphery of the town, thus expanding their damage. In time, a good range or even cultivated crops will be completely ruined by the activities of prairie dogs (BSFW 1974).

CONTROL: 1-16 (0.35%) strychnine oat bait is recommended. Baiting should be delayed until mid-May when females and young become active above ground. A teaspoon of bait should be well scattered over an area two to three feet in diameter, on bare ground two or three feet from the burrow in the zone where bare soil meets the growing vegetation. Bait should not be placed in the burrows where it will be covered and wasted, nor placed in piles so it could be picked up by livestock.

Bait should be applied on warm, sunny days. Baiting should not be attempted if rain or winds are forecast.

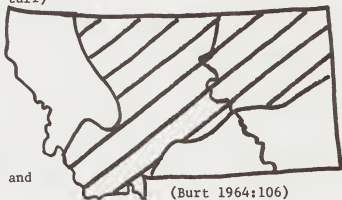
Before control is attempted, it is recommended prairie dogs be prebaited once or twice with untreated oats to accustom them to the oats. If they do not accept the bait readily after exposure an aversion to strychnine can develop, making successful control difficult (BSFW 1974).

If a black-footed ferret, Mustela nigripes, is seen in the vicinity of the prairie dog town, poisoning should not commence. This endangered member

of the weasel family seems to depend on the prairie dog both for shelter and food. There are very few of these animals left in the world (Cain 1972:86).

RICHARDSON GROUND SQUIRREL (flicker-tail)
Citellus richardsonii

RANGE: The Richardson ground squirrel is found in Montana extending over an area east of the mountain. It occupies central and eastern Montana except the southern and southeastern parts. It confines itself mostly to plains and foot hills and is not common in high mountain parks as are some of the other species.



(Burt 1964:106)

DESCRIPTION: The Richardson is a medium-sized ground squirrel of rather uniform coloration. The upper parts are a buffy yellow to grayish, with a fine irregular mottling of buffy to blackish under-coloring. The sides of the neck, limbs, and under parts vary from a buffy to grayish; the tail above is of a mixed blackish to buff, fringed with white hairs on the outer edges and end. It is about 1/4 of the total body length and not very bushy. The claws are slender, black and curved.

BIOLOGY: The young Richardson ground squirrels usually appear during early to middle May and run four to eight to the litter. They mature rapidly and soon eat a varied diet of seeds, roots, green vegetation, grains, and to a limited extent, insects or animal matter (BSFW 1974).

HABITS: The Richardson ground squirrel never occurs in dense forests. The animals live in groups or colonies which are little more than aggregations of

individuals in favorable habitats. At the slightest disturbance, they sit upright and utter a very high-pitched, twittering alarm. This species is strictly diurnal (Lechleitner 1969:94).

CONTROL: 1-16 (0.35%) strychnine oats is recommended. The wide distribution of the Richardson ground squirrel, particularly over marginal and other classes of range lands, keeps it close to the top of the list of damaging rodents. It not only does great damage to forage and cultivated crops but also is a carrier of the nymph and larvae stages of the Rocky Mountain wood tick, which may cause spotted fever and, in some cases, tularemia.

The Richardson is one of the easiest ground squirrels to control. It takes poisoned grain quite readily and does not have as high resistance to it as some other species have.

Use fresh bait for best results. Drop a teaspoon of poisoned oats near the burrow entrance allowing it to scatter over a small area. Do not drop grain into thick grass or loose dirt or down the burrow as it will be largely wasted. Use slightly larger quantities after the young appear.

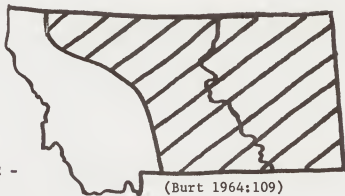
Baiting should be delayed until the females and young become active above ground. Early emergents are predominately males. Early baiting will result in poor control (BSFW 1974).



Richardson ground squirrel (Photo Brian Hanson)

THIRTEEN-LINED GROUND SQUIRREL
Citellus tridecemlineatus

RANGE: Plains of eastern Montana. It is found in all 18 counties.



DESCRIPTION: Head and body, 4 1/2 -

6 1/2 inches; tail, 2 1/2 - 5 1/4 inches;

(Burt 1964:109)

weight, 5 - 9 ounces. The base color varies from light to dark brown. On the side and back are 13 whitish strips, some broken into rows of spots, others more or less continuous. Belly whitish. No other ground squirrel within its range has definite stripes on the body (Burt 1964:107).

BIOLOGY: This squirrel mates in April and the young are born in May. The litter size is 7 - 10 (Burt 1964:107-108).

HABITS: It is solitary and feeds on seeds, insects, and occasionally meat. Opening to the burrow is usually concealed. They generally hibernate from October to March. The home range is 2 - 3 acres (Burt 1964:107-108).

CONTROL: 1-16 (0.35%) strychnine oats. Use fresh baits for best results. Drop a teaspoon of poisoned oats near the burrow entrance allowing it to scatter. Do not drop grain into thick grass, loose dirt or down the entrance as it will be largely wasted. Use slightly larger quantities after the young appear (BSFW 1974).



RATS

The Muridae family includes the Norway rat and house mouse. They inhabit warehouses, farm buildings and wherever food is stored. They are closely associated with man and his structures. The two species damage buildings and stored foodstuffs. In the United States the damage runs into millions of dollars.

NORWAY RAT Rattus norvegicus

RANGE: Inhabits all of Montana.

DESCRIPTION: Head and body, 1 - 10 inches; tail 5 - 8 inches; weight 7 - 10 ounces. Grayish-brown color and rather long scaly tail. Belly grayish not white.

BIOLOGY: Young 8 - 10. Twelve litters possible per year.

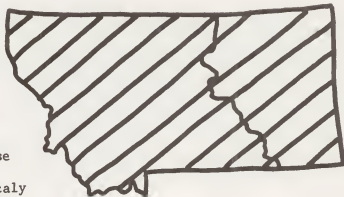
HABITS: Feeds on anything edible. Home ranges usually less than 100 feet across (Burt 1964:204-205).



HOUSE MOUSE Mus musculus

RANGE: Inhabits all of Montana.

DESCRIPTION: Head and body, 3 1/2 to 3 2/5 inches; tail, 2 4/5 to 3 4/5 inches; weight, 2/5 to 4/5 ounce. A small, grayish-brown mouse with a gray or buffy belly and a scaly tail about the same color above and below; fur fairly short.



BIOLOGY: Young 3-11. Several litters per year.

HABITS: Eats anything edible (Burt 1964:205).

CONTROL: "The only rodenticides that can be recommended for use out-of-doors by the general public, unless they contain an emetic, are fortified red squill and the anticoagulant poisons" (Johnson 1964:15). An emetic is a substance which causes vomiting. Rats can not vomit, so they can't get rid of the poison. Effective anticoagulant rodenticides include warfarin, pival, fumarin, PMP and diphacimone. Red squill has a natural emetic action and is effective against the Norway rat but not the house mouse. Mix 1 pound of red squill (500 mg. lkg. strength) with 9 pounds of bait (ground meat, bacon, canned fish or dog food). Generally anticoagulants can be mixed in the proportion of 1 part poison to 19 parts cornmeal. Fumigation with calcium cyanide is an effective method in burrow systems but should only be carried out by qualified personnel. One pound of calcium cyanide dust can gas 30-35 burrows (Johnson 1964).

Snap traps (3 1/2 x 7 inches for rats and 2 x 4 inches for mice) and steel traps (3 1/2 inch jaw, Oneida size, #0) can be used when poison baits are too dangerous or aren't working. No bait is required, so bait-shy rats can be eliminated, however, bait can also be used effectively. Poisons and traps should be placed in or near rat runs (Johnson 1964).

Flooding a burrow system is sometimes effective.

MICE

WYOMING POCKET MOUSE
Perognathus fasciatus

RANGE: All of the eastern 2/3 of Montana. Inhabits grasslands and sandy loam.

DESCRIPTION: Head and body 2 4/5 inches; tail 2 1/2 inches; weight 3-4

ounces. Color; olive-gray, with pale yellow on ears and a yellow wash along sides.

BIOLOGY: Young 4-6, 1 litter per year (Burt 1964:138).



WESTERN HARVEST MOUSE
Reithrodontomys megalotis

RANGE: Eastern half of Montana. Inhabits grasslands, open desert, weed patches; usually dense vegetation and near water.

DESCRIPTION: Head and body 2 4/5 to 3 inches; tail 2 1/3 - 3 1/5 inches; weight 1/3 to 3/5 ounce. Color ranges from pale gray, slightly washed with reddish brown or brown. Belly and underside of tail range from white to deep gray.

BIOLOGY: Young 2 - 4 (Burt 1964:160-161).

HABITS: Active throughout year. Feeds mostly on seeds. Nests usually on surface or in vines or tall vegetation.



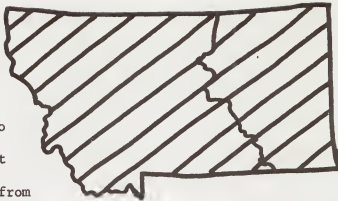
DEER MOUSE
Peromyscus maniculatus

RANGE: All of Montana. Inhabits nearly every dry-land habitat within its range.

DESCRIPTION: Head and body $2 \frac{4}{5}$ to 4 inches; tail 2 to 5 inches; weight $\frac{2}{3}$ to $1 \frac{1}{4}$ ounces. Color ranges from pale grayish buff to deep reddish brown. Tail always sharply bicolored, white below, dark above.

BIOLOGY: Young 3 - 5. 2 to 4 litters per year (Burt 1964:166-167).

HABITS: Nests in burrow in ground, in trees, and buildings. Feeds on seeds, nuts, acorns, and insects; stores food. Home range $\frac{1}{2}$ to 3 acres or more. Summer population 10-15 per acre is high.



WHITE-FOOTED MOUSE
Peromyscus leucopus

RANGE: Eastern half of Montana except south central. Inhabits woody or bushy areas.

DESCRIPTION: Head and body $3 \frac{3}{5}$ to $4 \frac{1}{5}$ inches; tail $2 \frac{2}{5}$ to 4 inches; weight $\frac{1}{2}$ to $1 \frac{1}{10}$ ounces. Upper parts pale to rich reddish brown; belly and feet white; tail usually shorter than head and body.

BIOLOGY: Young 2 - 6. 2 - 4 litters per year (Burt 1964:168).

HABITS: Feeds and stores seeds and nuts. Nests any place that affords shelter. Home range $\frac{1}{2}$ to $1 \frac{1}{2}$ acres. Average populations are 4 - 12 per acre.



CONTROL: Snap traps (2x4 inches) with or without bait are quite effective in smaller areas or around buildings. Baits that are acceptable to mice are bacon, sweets, grains or seeds, peanut butter, cheese, apples or sweet potatoes.

The following formula is suitable for a trap bait (Giles 1971:278).

- 2 lbs. melted beef suet
- 2 lbs. peanut butter
- 2 lbs. raisins, ground
- 2 lbs. oatmeal
- 1 lb. of high melting-point paraffin

If baits are not used an enlarged pan can be wired on the trap and the trap placed in mice runways where they are likely to trigger it (Johnson 1964).

The Elston trail builder can be used to distribute poison bait when there are large mice infestations in fields. The trail builder, pulled along behind a tractor, constructs artificial runways which intercept the mice runs. The poison bait is automatically released along intervals in the runways. The planted bait is unavailable to grazing animals, wildlife and humans (Elston 1974).



MUSKRAT
Ondatra zibethicus

RANGE: All of Montana. Found in streams, lakes, ponds and swamps.

DESCRIPTION: A large, aquatic, brown rat-like mammal with a laterally flattened, sparsely haired tail. The fur is thick and soft. The hind feet are large, front feet smaller. The claws are often pink (Lechleitner 1969:153)

BIOLOGY: Breeds April to August, 5-6 young, 2-3 litters a year, gestation 22-30 days (Burt 1964:204).

HABITS: Muskrats live in conical houses made of vegetation or burrows they dig in banks. All entrances are under water. Muskrats are mostly nocturnal. In the fall, populations can become very dense and some dispersal occurs (Lechleitner 1969:154-155). Of all the predators the mink has the greatest impact on muskrat populations (Errington 1967:23). When muskrats live near croplands they sometimes feed on the plants. Damage is often done to irrigation ditches when the muskrat digs.

CONTROL: Live trapping of muskrats is sometimes useful if there are few muskrats in the area and if they are transported far enough.

Steel leg-hold traps are selective for muskrats if properly used. (Single spring #1, jump trap #1, stop loss trap #1VG not necessary for drowning set, Oneida 1974). The trap is placed at exit and entrance points from the water. The anchor or stake should allow the muskrat to reach deep water where he will drown.

Conibear traps (#110 Oneida Victor, jaw spread 4 1/2 by 5 inches) can be used in shallow water. These traps have a pair of rectangular wires that close like scissors usually killing the animal instantly. This trap has been called



the most humane trap.

Zinc phosphide, a rodenticide, is effective against muskrats. Sweet potatoes, carrots and apples are coated or dusted with zinc phosphide. Zinc phosphide has an odor attractive to rodents. The baits are placed in burrows during low water or dropped into the tunnels. Treated baits can also be placed on rafts 4 by 4 feet or 4 by 8 feet, and anchored in the vicinity of damage (Giles 1971:516-517).

CONSLUSION

1. Many farmers and ranchers have rodent damage but are not taking steps to stop it.
2. Public land often hampers the use of chemical controls.
3. The use of rodenticides is the most effective rodent control technique.
4. The correct strength of rodenticides (e.g. 1-10 strychnine oats) can be obtained in any of the EDAEM counties.
5. At the present time there is an extreme need for a rodent control program.
6. At the present time there is no state organized rodent control program.



RECOMMENDATIONS

1. EDAEM should initiate or support legislation for a state rodent control program.
2. An education program for the rancher on the type of control methods presently available, is needed. Radio announcements, newspaper articles, television or workshops could be used for this purpose. EDAEM and county range committees could participate in such an education program.
3. Cooperation should be encouraged between federal land administrative agencies and ranchers involving rodent control measures. EDAEM could encourage faster response by the agency in taking steps to control rodent damage.
4. County rodenticides distributors should be made aware of the availability of 1-10 strychnine oats, for pocket gopher control, from the Fish and Wildlife Service, Billings. Perhaps EDAEM could send correspondence to each dealer.
5. EDAEM should distribute the author's report to interested groups and individuals.

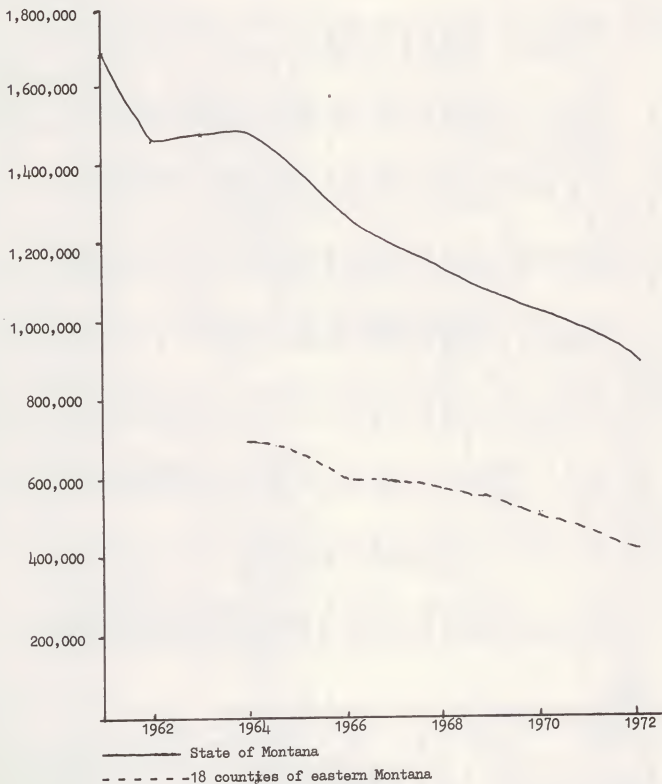


APPENDIX 1 Number of Stock Sheep and Lambs in the 18 counties of Eastern Montana (Statistical Reporting Service, U.S.D.A. and Montana Dept. of Agric.)

Counties	1964	1965	1966	1967	1968	1969	1970	1971	1972
Phillips	22500	22000	21000	21000	19000	19000	22000	23500	21000
Valley	27000	25900	21800	22000	21000	22000	20000	17000	13500
Daniels	7200	6700	6500	6500	6500	6500	8000	6500	6500
Sheridan	5800	5900	6000	6500	6500	6500	4500	3500	3000
Roosevelt	8000	8000	6600	7000	7000	7000	5500	6000	7000
District 1	70500	68500	60900	63000	60000	61000	60000	56500	51000
Petroleum	14000	14000	13500	12000	13000	14000	12000	11000	10000
Garfield	140000	140000	132500	131000	132000	125000	103000	94000	92000
McCone	36000	36000	33500	34000	32000	33000	28000	31000	23500
Richland	16000	16000	18000	22000	19000	21000	35000	25000	22000
Dawson	21000	21000	19000	21000	21000	21000	21000	19000	17500
Prairie	15300	15000	14000	15000	15000	14000	8700	9500	6500
Wibaux	8500	8300	7200	7500	7500	7500	8500	8500	9500
District 2	250800	250300	237700	242500	239500	235500	216200	198000	181000
Treasure	3900	3900	3100	3000	4000	6000	4000	4000	2800
Rosebud	40000	40000	41000	38000	38000	36000	24000	25000	23500
Custer	40000	41000	33000	31000	32000	25000	30000	30000	25000
Powder River	62500	63100	57000	57000	56000	56000	53000	50000	44000
Fallon	11000	10500	9400	9500	9500	9500	10800	11000	9500
Carter	190000	180500	161000	157000	152000	140000	139000	135000	127000
District 3	347400	339000	304500	295500	291500	272500	260800	255000	231800
18 county total	668700	657800	603100	601000	591000	569000	537000	509500	463800



APPENDIX 2 Number of Sheep in Montana and in the 18 Eastern Counties
From 1961-1972 (Statistical Reporting Service, U.S.D.A. and Montana
Dept. of Agric.)



APPENDIX 3 Number of Cattle and Calves in the 18 counties of Eastern Montana (Statistical Reporting Service, U.S.D.A. and Montana Dept. of Agric.)

<u>Counties</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>
Phillips	91200	95000	97600	97000	98000	101000	95000	97000	96000
Valley	80300	83000	85300	91000	92000	85000	83000	88000	87800
Daniels	20000	21100	21500	23000	24000	22000	19000	21000	21000
Sheridan	30000	31700	32000	34000	35000	31000	29000	32000	32000
Roosevelt	38700	41000	41700	45000	45000	45000	37000	41000	40900
<u>District 1</u>	<u>260200</u>	<u>186300</u>	<u>278100</u>	<u>290000</u>	<u>294000</u>	<u>284000</u>	<u>263000</u>	<u>279000</u>	<u>277700</u>
Petroleum	29700	31000	31100	29000	33000	33000	31000	33000	31900
Garfield	56600	59000	63600	62000	70000	66000	76000	80000	80600
McCone	42200	43500	46500	49000	51000	50000	46000	45000	44000
Richland	50400	55200	60000	61000	64000	61000	55000	54000	58200
Dawson	46800	48500	49400	51000	56000	55000	50000	51000	50400
Prairie	39500	41500	41800	42000	40000	42000	40000	43000	43500
Wibaux	21600	22500	23400	24000	24000	25000	23000	24000	24300
<u>District 2</u>	<u>286800</u>	<u>301200</u>	<u>315800</u>	<u>318000</u>	<u>338000</u>	<u>332000</u>	<u>321000</u>	<u>330000</u>	<u>332900</u>
Treasure	21300	23000	23400	23000	23000	23000	31000	33000	31800
Rosebud	72700	77000	78400	76000	75000	78000	91000	99000	99200
Custer	75200	78000	81700	78000	81000	77000	88000	93000	94100
Powder River	65000	67000	69500	67000	68000	70000	78000	85000	86800
Fallon	37700	39000	41000	41000	41000	40000	40000	42000	46300
Carter	42500	45000	47200	47000	49000	49000	58000	62000	65800
<u>District 3</u>	<u>314400</u>	<u>329000</u>	<u>341200</u>	<u>332000</u>	<u>337000</u>	<u>337000</u>	<u>386000</u>	<u>414000</u>	<u>424000</u>
18 county total	861400	816500	9351	940000	969000	953000	970000	1023000	1034600



APPENDIX 4 EDAEM Survey form sent to Wool Growers in Eastern
Montana (18 counties) July and August 1974

Cooperative Extension Service

MONTANA STATE UNIVERSITY, U.S. DEPARTMENT OF AGRICULTURE, AND MONTANA COUNTIES COOPERATING

For the Economic Development Association
of Eastern Montana

P. O. Box 388
Sidney, Mt. 59270
Telephone 482-3035

Dear Rancher:

The Cooperative Extension Service and the Economic Development Association of Eastern Montana would like you to complete the following survey form. To justify rodent and predator control programs and to conduct a cost versus benefit of control methods, an accurate account of the damage done by each animal must be obtained. Your help in filling out this form will accomplish both goals. The hard facts can then be used to convince Legislators and Congressional Representatives. The information requested in the survey will remain confidential and your signature is not required. Your cooperation in returning this survey promptly (within 10 days) will facilitate the processing of the information. The results of the survey can be obtained from the above address.

Thank you.

Sincerely,

Calvin J. Oraw
Area Community Development Agent

Ranchers Name _____
Mailing Address _____
Closest Town _____ County _____
Total Acres (leased or owned) in rangeland _____ in cropland _____

RODENT DAMAGE JAN. 1 to JULY 1, 1974

Rodent	Type of Damage	Economic Loss in \$
Richardson Ground Squirrel		
Prairie Dog		
Pocket Gopher		
Rats and Mice		
Others (list name)		

Did you have a rodent control program? YES _____ NO _____
If yes, what method and how effective (25% effective, etc.) _____

APPENDIX 5 EDAEM Survey Form Sent to Wool Growers in Eastern Montana (18 counties) July and August 1974.
LIVESTOCK LOSSES
January to July 1, 1974

Kind of Livestock	Maximum Number on Farm During Jan. to July 1, 1974	Total Lost or Dead	All Unknown Causes	Coyotes	Dogs	Red Fox	Bobcats	Other Known Causes*
	Head	Head	Head	Head	Head	Head	Head	Head
Cattle								
Calves								
Sheep								
Lambs								
Swine								
Other (Specify)								

* Disease, weather, poison, theft, old age, etc.

Check space if you received predator control services from the Bureau of Sport Fisheries and Wildlife _____
Department of Livestock _____, County Trapper _____, Private Trapper _____, or Sportsman _____.

If yes, what type of service (aircraft etc.) _____

How much service (in hours) _____ How many animals were taken _____

Were you satisfied with the service? YES _____ NO _____

If yes, what method did you use _____

How many animals were taken? _____

What control method do you think is the most effective (also consider methods not currently being used) _____

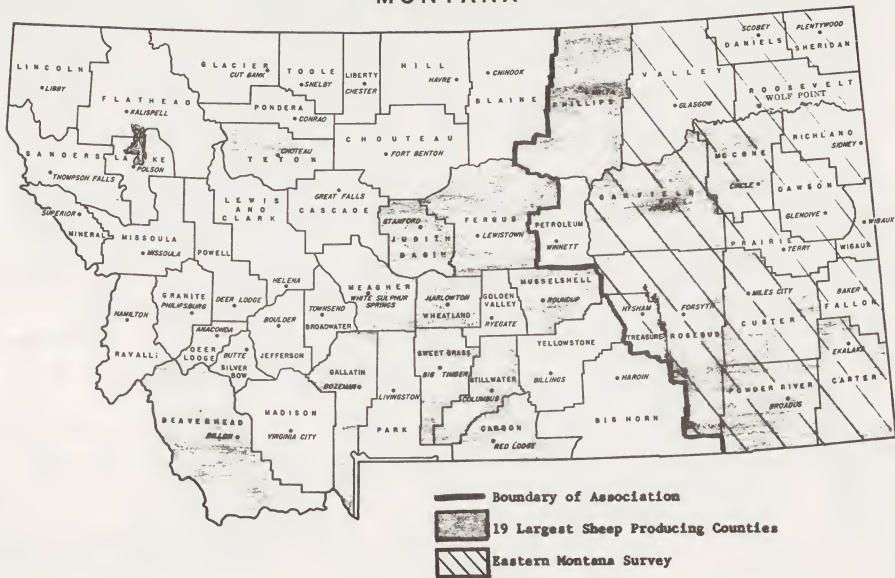
What are your plans for sheep production in the future? Increase _____ About the same _____ Decrease _____
Quitting _____.

Comments:

Appendix 6 Counties Included in Department of Livestock Predator Loss Surveys

Counties Included in Department of Livestock Predator Loss Surveys

MONTANA



APPENDIX 7 Evaluation of Control Techniques (careful and conscientious use is assumed, Cain 1972:63)

Technique	Effectiveness Propyl- lactic	Trouble- shooting	Economy	Safety man and Live- stock	Selectivity takes only target species	Specificity takes only offending individuals	Humane- ness	Lack of environ- mental impact
Aerial Shooting	+	+++	-	+++	++	+	+	+++
Ground Shooting	-	++	+	+++	++	++	+	+++
Den Hunting	-	++	+	+++	++	++	++	+++
Steel Traps	+	++	++	++	-	+	++ ¹	+++
Cyanide Guns ²	++	-	++	-	-	+	++	+++
Poisons:								
Strychnine	+++	+	+++	-	-	-	--	+
Thallium	+++	+	+++	-	-	-	-	-
1080	+++	+	+++	-	-	-	-	-
Reproduction Inhibitors	++		++	+++	+	-	+++	++
Live Trap and Transplant	-	++	-	+++ ¹	++	++	+++	+++
Repellents	-	+++	-	+++	+++	+++	+++	++

KEY

-- Very Bad
- Poor
+ Fair
++ Good
+++ Very Good

¹ Steel traps properly used are humane, improperly used are inhumane

² Cyanide guns or coyote getters (propels sodium cyanide with explosive charge) were replaced with the M-44 (spring loaded) by the Bureau of Sport Fisheries and Wildlife by October 1970

APPENDIX 8 Coyotes Taken and Control Method Used by the Fish and Wildlife Service in Montana (source Paul Bunke)

<u>YEAR</u>	<u>TRAP</u>	<u>M-44</u>	<u>PREDACIDES</u>	<u>SHOT</u>	<u>AIR</u>	<u>DEN</u>	<u>MISC.</u>	<u>TOTAL</u>
1963	367	767	45	121	121	268	1	1,690
1964	470	697	38	180	270	326	3	1,984
1965	614	852	42	203	717	213	2	2,643
1966	389	472	30	99	398	172	-	1,559
1967	358	324	36	148	345	91	8	1,310
1968	350	313	40	161	345	131	1	1,341
1969	307	458	47	196	771	113	2	1,894
1970	383	408	92	238	731	94	9	1,955
1971	275	364	78	256	865	145	10	1,993
1972	405	412	14	216	1,474	217	6	2,744
TOTAL	3,918	5,067	462	1,818	6,037	1,769	42	19,113
PERCENT	20.5	26.5	2.4	9.5	31.6	9.3	.2	
1973	947			370	2,493	338	16	4,164
	22.7			8.9	59.9	8.1	.4	
1974 (July through April)	847			212	2,457	15	13	3,544
	23.9			5.9	69.3	0.4	0.3	

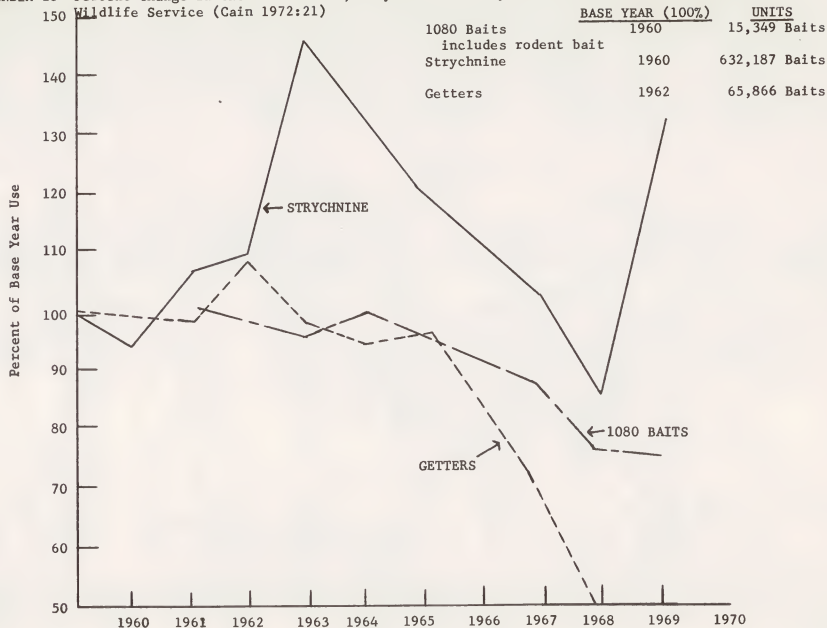
APPENDIX 9 Predatory Animals Taken by Control Methods by the Fish and Wildlife Service (includes regions 1, 2 and 6 in United States (Melcher 1974:166)

	Traps	M-44's	Preda- cides ¹	Shot	Air- craft	Den- ning	Dogs	Snares	Live traps	Total
Fiscal year 1971:										
Coyotes	26,809	20,960	7,454	5,167	6,658	6,113	299	2,201	-	75,661
Bobcats	5,680	11	76	285	23	11	156	365	1	6,608
Bears	6	10	--	14	--	--	58	146	-	234
Mountain Lions	19	--	--	--	--	--	27	4	-	50
Fiscal year 1972:										
Coyotes	27,413	13,812	3,988	6,285	11,437	6,437	96	1,830	-	71,298
Bobcats	4,578	10	43	266	31	18	78	324	3	5,351
Bears	6	2	--	15	--	1	28	139	-	191
Mountain lions	6	1	--	3	--	--	36	3	-	49
Fiscal year 1973:										
Coyotes	39,259	(2)	(2)	7,611	20,492	6,432	161	2,535	-	76,490
Bobcats	3,802	(2)	(2)	251	87	16	84	286	-	4,526
Bears	--	(2)	(2)	18	--	--	35	143	-	196
Mountain lions	7	(2)	(2)	1	--	--	19	2	-	29

¹ Includes only those animals which were recovered.

² Chemical toxicants not used for predator control.

APPENDIX 10 Percent Change in the Use of 1080, Strychnine and Coyote Getters 1960-1969, Fish and Wildlife Service (Cain 1972:21)



APPENDIX 11 Coyote Predation Information on State Wide Number of Damage Requests and Numbers of Livestock Killed (Fish and Wildlife Service, source Paul Bunke)

<u>Fiscal Year</u>	<u>No. Damage Control Request</u>	<u>Sheep Killed</u>	<u>Lambs Killed</u>	<u>Total</u>	<u>Cattle Killed</u>	<u>Calves Killed</u>	<u>Total</u>
1968	1,036	402	1,933	2,335	0	30	30
1969	949	295	1,732	2,027	1	38	39
1970	605	401	914	1,315	0	33	33
1971	659	174	1,399	1,573	0	60	60
1972	922	371	2,839	3,210	0	53	53
1973	1,573	491	3,647	4,138	2	119	121
1974 (Through April)	1,473	485	3,093	3,578	1	227	228

Sheep and lambs % increase 1970—1973 = 215%

% decrease in sheep number 23.9 for same period

Cattle and calves % increase 1970—1973 = 267%

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ECONOMIC DEVELOPMENT ASSOCIATION OF EASTERN MONTANA

The Economic Development Association of Eastern Montana, organized September 1970, is a voluntary organization, composed of representatives from each of the eighteen eastern Montana counties and is receiving considerable support from community organizations, local government, state and federal agencies. The need for combining the efforts of eighteen counties became apparent following the 1970 census of population, which indicated a loss within the area of over 13,000 people during the sixties. Through the Association, the counties are working together to develop action programs that will make the many small towns and rural communities in eastern Montana a better place in which to live and earn a living. Three full-time employees are assigned to assist the Association.

The Association's purpose is to (a) provide leadership required for developing and carrying out plans for the orderly development, improvement, conservation and efficient use of all available resources, (b) take the necessary action to insure improvement of the economic opportunities for the people in eastern Montana, (c) secure federal, state, local governmental, private individual, and private business assistance, and (d) promote mutual cooperation between local, state, federal, private agencies and individuals.

The Association is organized into committees to work on common problems on a multi-county Association basis. The committees are: Agriculture, Education, Finance, Recreation and Tourism, Transportation, and Water Development and Conservation.

The Association committees have been responsible for initiating over 56 different projects in eastern Montana since its inception. These projects have varied from education programs for small business and community leaders to securing special funds for improving the economic base of eastern Montana.

The old "UNITED WE STAND, DIVIDED WE FALL" premise has never been truer in eastern Montana than it is today. The problems individual counties face today are of such magnitude and complexity that they require the combined efforts of the eighteen county Association.



WESTERN INTERSTATE COMMISSION FOR HIGHER EDUCATION, WICHE
RESOURCES DEVELOPMENT INTERNSHIP PROGRAM, RDIP

WICHE is an organization formed by the thirteen western states for the purpose of relating the resources of higher education to the needs of western citizens. The mission of the WICHE RDIP is to organize and encourage professional internships that will contribute to the development of the West's human and environmental resources. These internships provide practical training and experience to the interns as well as useful public service to the areas and organizations which they serve. With the guidance and assistance of agency officials, experienced specialists in his or her field, university faculty members, and local citizens, the intern carries out a professional project chosen by the sponsoring agency. While serving the needs of the needs of the sponsoring agency, the intern gains practical experience and professional maturity by honing technical skills learned in college against the hard whetstone of reality. He or she has an opportunity to apply part of what was learned in school to the practical needs of the region in which he or she serves.

All Resources Development Interns should be U.S. citizens who have completed at least two years of college work in which they have demonstrated basic technical skill, academic achievement, writing ability, personal maturity, and the capacity and motivation for independent work. They must devote full time to their projects during the internships. Nominations come from educational institutions, individual faculty members, and from prospective interns themselves. Final selection is made by the sponsoring agency, subject to approval and official appointment by RDIP.

Each intern is supervised by his or her sponsor, guided by a project advisory committee, usually consisting of representatives of the sponsoring agency; a technical advisor with related experience; and other concerned public leaders. The committee helps define project objectives and suggests methods of approach at the start of the project; but the intern must carry out the project largely on his or her own initiative.

The final step in each project is usually the preparation of a report organizing the findings of the project. The report is written for use by the sponsoring agency and must meet the standards of acceptable professional quality. The report is reviewed and approved by the sponsor and by RDIP.

This intern report was read and accepted by a staff member at:

Agency: Economic Development Association of Eastern Montana

Address: P.O. Box 388
Sidney, Montana 59270

This report was completed by a WICHE intern. This intern's project was part of the Resources Development Internship Program administered by the Western Interstate Commission for Higher Education (WICHE).

The purpose of the internship program is to bring organizations involved in community and economic development, environmental problems and the humanities together with institutions of higher education and their students in the West for the benefit of all.

For these organizations, the intern program provides the problem-solving talents of student manpower while making the resources of universities and colleges more available. For institutions of higher education, the program provides relevant field education for their students while building their capacity for problem-solving.

WICHE is an organization in the West uniquely suited for sponsoring such a program. It is an interstate agency formed by the thirteen western states for the specific purpose of relating the resources of higher education to the needs of western citizens. WICHE has been concerned with a broad range of community needs in the West for some time, insofar as they bear directly on the well-being of western peoples and the future of higher education in the West. WICHE feels that the internship program is one method for meeting its obligations within the thirteen western states. In its efforts to achieve these objectives, WICHE appreciates having received the generous support and assistance of the Economic Development Administration; the Jessie Smith Noyes Foundation; the National Endowment for the Humanities; the National Science Foundation; the Division of Education of HEW; and of innumerable local leaders and community organizations, including the agency that sponsored this intern project.

For further information, write Bob Hulinghorst, Director, Resources Development Internship Program, WICHE, Drawer 'P', Boulder, Colorado 80302, (303) 443-6144.



